Volume VII
Number 6

JUNE, 1916

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JUL 3 1916
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THE JOURNAL OF Educational Psychology

INCLUDING EXPERIMENTAL PEDAGOGY, CHILD PHYSIOLOGY AND HYGIENE, AND EDUCATIONAL STATISTICS

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PUBLISHED MONTHLY, EXCEPT JULY AND AUGUST.
WARWICK & YORK, INC.,
LANCASTER, PA. BALTIMORE, MD.

[Entered as second-class matter at the postoffice at Lancaster, Pa., under the Act of March 3, 1879.]

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VOLUME VII JUNE, 1916 NUMBER 6

THE JOURNAL OF
EDUCATIONAL PSYCHOLOGY

TESTS FOR ORIGINALITY[1]

LAURA M. CHASSELL
La Crosse, Wisconsin

GENERAL PLAN OF THE EXPERIMENT

The purpose of the investigation was (1) to adapt and devise tests for originality, and (2) to determine by trial the relative value of these tests as a means of ranking the members of a group in terms of originality. The selected tests were applied to 100 students drawn from all classes in Northwestern University and also to one inventor of international reputation.

After preliminary experimentation with a variety of tests, the following twelve were selected and modified for subsequent use: (1) Word-Building; (2) Picture Writing; (3) Analogues; (4) Original Analogues; (5) the Chain Puzzle; (6) the Triangle Puzzle; (7) Royce's Ring; (8) the Completion Test; (9) Economic Prophecies; (10) the Code Test; (11) the Invention for Sheet Music; and (12) Novel Situations. Of these, Picture Writing, Original Analogues, Economic Prophecies, the Invention for Sheet Music, and Novel Situations were devised in the Psychological Laboratory of Northwestern University; the remainder were adaptations or modifications of tests previously used elsewhere.

A time-keeping device, which made it possible for the subjects to record their own time, was constructed. The "minute hand" was a series of cards numbered from 0 to 10. These were sus-

[1] This article represents in a condensed form the material submitted by the author as a master's thesis at Northwestern University in 1914. Credit for general arrangement and oversight of the work should be given to Professor W. D. Scott, under whom the investigation was conducted.

pended on a rod, and removed one by one at intervals of sixty seconds. The "second hand" was a placard upon which had been pasted numerals from 1 to 60, inclusive. Each succeeding second was indicated with a pointer by the experimenter.

There follows a description of the twelve tests.

1. Word-Building

The test followed the directions given in Whipple's *Manual of Mental and Physical Tests*, 2d edition, page 641, save that the time was reduced from five to three minutes, that only the *AEOMBT*-form was used and that *A* and *O* were not counted as words. The instructions to the subjects were first given orally with illustrations, then given again by means of a large placard on which they were displayed.

2. Picture-Writing

For this test five specially prepared cards were used. The first card was shown with this explanation: "These characters are picture writing and have actually been used by a people to express the meaning written after them. The third word is made up of the elements contained in the other two." After this first card had been explained, the four remaining cards were exhibited for a period of two minutes each. A score of 1 was credited for each card correctly solved.

The actual characters used were Chinese: in the following description of the cards the original symbols are replaced, for convenience in reproduction, by Roman letters. The original cards showed clearly that the third character represented in each case a combination of the first and second character.

Sample card
A means *country*
B means *people*
AB means *democracy*

Card 2
C means *enclosure*
D means *man*
CD means what ? (noun)

Card 3
E means *to take*
F means *woman*
EF means what ? (verb

Card 4
G means *sun*
H means *horizon*
G means what ? (noun)
—
H

Card 5
I means *to quiet*
J means *heart*
IJ means what ? (verb)

3. Analogues

This test was suggested by the analogies test used by Wyatt. The material, however, was entirely new. Papers on which were the following analogues were distributed face downward:

Illustrations:

1. a hoe : a gardener :: scissors : (a tailor).
2. a county : (a state) :: a room : a house.
3. a ring : the finger :: (a bracelet) : the arm.

In the following, supply in the brackets the word needed to complete the relationship:

1. a cat : a mouse :: a hawk : ( ).
2. a consistent worker : a spasmodic worker :: ( ) : a geyser.
3. an automobile : ( ) :: a safety match : flint.
4. a common pen : a fountain pen :: odd jobs : ( ).
5. a caterpillar changes to a cocoon, then changes to ( ), as ice changes to ( ), then changes to steam.
6. *ab* : *bc* :: democracy : ( ).

N. B.[2] *a* is the picture writing for people.
b is the picture writing for king.
c is the picture writing for enclosure or country.
ab is the picture writing for democracy.

Before the subjects looked at the papers the experimenter explained that analogues were "word-ratios," and illustrated this statement by placing several upon the blackboard. Those who completed the test within the allotted eight minutes were instructed to record their time.

The scoring was complicated because of errors, omissions, and lack of uniformity in time. The final score was calculated by adding to the time recorded by the subject, a fine of one-sixth of this time, plus an additional minute for each error or omission save that in the fifth analogue, in which two terms were to be supplied, each error or omission counted one-half the usual fine.

4. Original Analogues

The instructions for this test were first given orally, then shown on a placard, which read:

Make two original analogues.
Record the time.

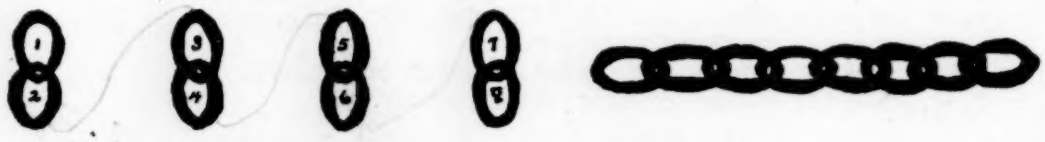
In scoring the recorded time was (1) decreased one-fourth for excellent quality, increased one-half for poor, and left unaltered for good; and (2) decreased one-sixth for each analogue given beyond the required two, and increased one-half for failure to

[2] Here the letters *a*, *b*, and *c* have been substituted for the Chinese symbols actually used.

give more than one. This arbitrary evaluation of quantity seemed justified because of the probability that less time is required to write a second or a third analogue than to write the first.

5. The Chain Puzzle

The instructions for this test were as follows: "A farmer had four pairs of links which he wished to have united into a continuous chain. Each cut was to cost ten cents and each weld ten cents. Show how this could be accomplished at a total cost of forty cents." Links of paper were prepared so that there could be no misunderstanding as to the relation of the various links to one another. They were then drawn and numbered as in the accompanying illustration.



On the placard of instructions was written:

Each cut — 10c.
Each weld — 10c.
Total cost — 40c.
It can be done.

Ten minutes was allowed for the solution of the problem. The time recorded by the students determined their score.

6. The Triangle Puzzle

These instructions were presented on a placard:

"Out of six toothpicks make four equilateral triangles, each side of which shall be as long as a toothpick. It can be done. Record the time."

In order that the solution might depend upon constructive thinking alone, as was explained, no actual materials were supplied. The time-limit was ten minutes. The score was the time required.

7. Royce's Ring

Royce's ring is made from a narrow strip of paper, the ends of which are pasted together after a twist of 180 degrees. A red line marked the longitudinal center of either side of our ring.

The experimenter explained the construction of the figure by preparing a similar ring before the class. The experiment was

then conducted in three distinct parts. The first direction was as follows: "Describe fully the figure which would result if the ring were cut along the central line, including in your answer these three points: (1) the number of rings; (2) their interconnection; (3) the number of degrees of twist." After the descriptions had been written, the ring was cut. The resulting figure, a ring with a twist of 720 degrees, was then shown to the class and very carefully explained. The second direction was to describe the figure which would result if the ring were again cut. Then, when the ring had been cut and the resulting figure, two interlocked rings, each with a twist of 720 degrees, had been explained, the last direction, to describe the figure which would result if the rings should be similarly cut, was given. Again the rings were cut as previously, producing four rings each with a twist of 720 degrees.

In the grading of the first part, a score of 9 was given for a correct solution, a score of 6 for the answer: "one ring twisted 360 degrees." Because of the decreasing difficulty of the problem, a score of 6 was given for the correct solution of the second part and one of 3 for the third. Less value was given to partially correct answers. The final score was the total of these gradings.

8. The Completion Test

Completion Test No. 1 (Whipple's *Manual*, p. 652) used with the instructions:

> "Supply all missing words or letters. Try first of all to 'make sense'; second, to fill in every omission; third, to work as rapidly as possible. The length of each dotted line shows approximately the length of the word or portion of a word to be supplied."

The time-limit was 7 minutes in scoring, each omission filled correctly was given full credit; each one filled partially correctly, one-half credit. The score was the total credits.

9. Economic Prophecies

The experimenter spoke preliminarily to this effect: "Five hundred years ago the automobile, the air-ship, and the steam railroad were entirely unknown means of locomotion. If any one then had said that today we should be traveling by these means, his statement would have been an economic prophecy. At that time, also, the present methods of heating by furnace

and steam radiators were unheard of. Advertising was an undeveloped science. Skyscrapers had not yet been constructed. You are now to be asked to make some economic prophecies." The subjects were then directed to suggest as many entirely original means as possible of (1) locomotion, (2) heating, (3) introducing the product to the consumer, (4) housing for people. These topics were announced by four placards and two minutes were allowed for each one. The suggestions were graded on a scale from 0 to 5 in proportion to their originality. The final score was the total of these gradings.

10. The Code Test

The civil war code described by Healy and Fernald[3] made the basis of this test.

The placard upon which the code was written was displayed for fifteen seconds to give the subjects an idea as to its nature. To illustrate its use the experimenter then showed a second placard on which was written the word *celery* and its code translation. The code placard was again displayed, in juxtaposition with the second placard, while the experimenter indicated from what portion of the code the symbols were taken. Then the subjects were told that the code would again be shown for a period of sixty seconds, after which they would be given (1) a message to translate into the code language, and (2) one in the code language to read. These two messages were printed upon placards thus: (1) Come quickly. (2) (in the symbol of the code) "Foe near at hand; beware!" The subjects recorded their own time. The time-limits were three minutes first, and three and a half minutes for the second message.

In scoring, since there were eleven letters in the first message, a fine of one-eleventh of the allotted time was imposed for each error or omission; similarly for the second message, of one-nineteenth. Disregard of a dot was fined one-half the usual amount. The final score was the sum of the time recorded in each portion, plus the fine.

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[3] W. Healy and Grace Fernald. *Tests for Practical Mental Classification.* Psychol. Monog. March, 1911, Whole No. 54, pp. 33f.

11. The Invention for Sheet Music

For this test the following instructions were displayed on a placard

"Numbering each, suggest as many details as possible for an invention to turn the pages of sheet music."

In judging the papers, the experimenter first placed in one group those suggesting inventions which would actually turn several pages of sheet music; in a second, those suggesting a means for turning one page; in a third, those suggesting less complete devices; and so on. She then arranged the papers within the groups in order of merit. The final score was determined by the rank-order of the subjects.

12. Novel Situations

The following questions were handed, face downward, to the subjects:

1. If some inexpensive metal should be discovered which, when put in cables, could transmit light at slight cost, what results would follow?
2. If trusts should get control of the surface of all oceans, what competition could arise which would offer means of transportation?
3. If all water, because of some change in its chemical constitution, should contract instead of expand upon freezing, what would be the effect upon animal life, including man?
4. If the prophecies that the earth is going to cool down should come true, what could man do to keep from becoming extinct for a time at least?
5. If the possession of money or wealth in any form should come to be regarded as dishonorable, what significant changes would result?
6. If, because of the exhaustion of materials from which paper is made, its manufacture should absolutely cease, what substitutions could be made?

The instructions were as follows: "Please read and answer only the first question at this time. You will be given two minutes and thirty seconds for this. Stop writing when the experimenter calls time; then pass to the second one; and so on, until the entire six have been answered."

The method of scoring was similar to that employed in Economic Prophecies, i. e., the final score was the sum of the gradings.

The Results

In this article it has been necessary to omit the original scores. On the basi. of these scores there was calculated the rank-order of the 100 students in each test, and also his final group rank,

which was determined by the median of his several ranks (unless the medians were tied, in which case the averages were used).

In the summary tables that follow these abbreviations are used: W. B., Word-Building; P. W., Picture-Writing; Ana., Analogues; O. A., Original Analogues; Cha., the Chain Puzzle; Tri., the Triangle Puzzle; Roy., Royce's Ring; Com., the Completion Test; E. P., Economic Prophecies; Code, the Code Test; I. M., the Invention for Sheet Music; N. S., Novel Situations.

1. Range of Performance

A general idea of the performances of the students in the several tests may be gained from Table 1, in which is shown the best, the median and the poorest score in each test. The symbol *F* in the third line means "failed to accomplish the test within the time-limit set."

TABLE 1

Limiting and Median Scores

Test	W.B.	P.W.	Ana.	O.A.	Cha.	Tri.	Roy.	Com.	E.P.	Code	I.M.	N.S.
Best....	23	4	104″	37″	50″	50″	15	99	60	162″	1	76
Median.												
Worst..	7	0	760″	405″	F	F	0	12	0	F	96	8

2. Correlations

In Table 2 there are shown the correlations existing between the rank-order of the 100 subjects in the several tests and their amalgamated rank-order for all the tests combined. These correlations, which were computed by the Spearman "foot-rule" method with *R* converted into *r*,[4] indicate the relative degree to which the outcome of each test agrees with the general outcome of all the tests. The probable error of *r* for 100 cases may be taken as approximately 0.04.

TABLE 2

Correlations between the Several Tests and the Final Rank-Order

W.B.	P.W.	Ana.	O.A.	Cha.	Tri.	Roy.	Com.	E.P.	Code	I.M.	N.S.
.25	.40	.57	.54	.54	.54	.41	.44	.55	.26	.52	.56

3. Reliability of the Single Tests

In Table 3, an indication of its reliability is given for each test by adding the per cent. of subjects among the first twenty-five

[4] For the method see Whipple, *Manual of Mental and Physical Tests*, 2d edition, pages 43–44, Formulas 33 and 35.

of the group of one hundred whose rank in the test under consideration is greater than that of the median rank of the last subject in the group, 37 +, and the per cent. of subjects among the last twenty-five whose rank is less than the median rank of the first subject in the group, 60.5. This method shows, then, the per cent. of subjects in the first and the last quarter of the group who would have been thrown out of their respective divisions had but the one test been used in ranking them.

TABLE 3

Reliability

W.B.	P.W.	Ana.	O.A.	Cha.	Tri.	Roy.	Com.	E.P.	Code	I.M.	N.S.
39	84	29	28	20	74	46	30	32	42	25	36

4. Rank of Each Test as a Probable Measure of Originality

Table 4 gives the ranking of the tests upon the basis (1) of their correlation with the final group rank, (2) of the per cent. of subjects among the first and the last twenty-five who would have been thrown out of their respective groups had but the test under consideration been used in ranking them, and (3) of the sum of (1) and (2).

W.B.	P.W.	Ana.	C.A.	Cha.	Tri.	Roy.	Com.	E.P.	Code	I.M.	N.S.
12	10	1	4	5	6	9	8	3	11	7	2
8	12	4	3	1	11	10	5	6	9	2	7
10.5	12	1	3	2	8	9	7	5	10.5	5	5

The correlation, obtained by the Pearson method adapted to rank-differences is .50.

Comment on the Tests

The tabulated results alone are not sufficient basis for evaluating the tests because of inadequacies in the method of giving the test or in the system of scoring. Supplementary observations may, therefore, assist in reaching a fairer judgment.

Word-Building has the lowest correlation with the amalgamated rank-order. This is probably due to the fact that about one-half of the subjects had played anagrams, as was ascertained by means of a questionnaire, and these subjects consequently had some advantage over other members of the group. The test would doubtless have been fairer, therefore, had a foreexercise been given. The rank correlation between word-building and the completion test, the one seemingly most closely related to it, is only .28, which is less than would have been

anticipated except for the interference of this factor.* Terman found the use of a rational plan an important element in the procedure of those subjects who succeeded best in these tests. Whipple used word-building to test imagination and invention, but did not report the finding of any significant correlations.

Picture Writing gives promise of becoming a very valuable test if a few slight changes in the method are made, since its correlation with the final group rank is considerably higher than might be expected from the large number of "ties,"—a factor tending to reduce correlation. Since but one subject in the first group failed to determine the correct word to be supplied, as compared with eight subjects in the fourth group, it is clear that the test differentiates the good group and that the addition of more cards would yield still better results. Probably the length of time allowed for each card could be shortened, also, since many of the subjects did not require the full two minutes.

Analogues ranks first among the tests. It might have been even more valuable, however, if the "picture writing" analogue (No. 6), which was by far the most difficult, had been replaced by one more nearly like the others, or if the time required for the solution of the five similar analogues and that for the solution of the sixth had been separately recorded. Wyatt found that his analogies test gave a very high correlation with subjective estimations of intelligence, as did also the ocmpletion test.

Original Analogues is likewise very successful.

The Chain Puzzle can be modified so as to become a very effective test. Since but five subjects of those ranking among the first twenty-five of the group, nine among the second, twenty among the third, and twenty among the fourth, failed to solve it; and since thirty-one of the forty subjects who succeeded in solving the puzzle are within the first half, it is evident that this test differentiates the good subjects quite successfully. Indeed, of all tests, this best determines the first and the last groups of twenty-five. The fact that the correlation with the final group rank is relatively high, notwithstanding the large number of ties, is another proof of its value. A greater differentiation and

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* Wyatt has reported raw correlations of .36 and .70, and a corrected correlation of .97, between these two tests.—*Editor*.

possibly a still higher correlation would be secured if the time allowed for solution were increased to fifteen minutes.

Similar observations may be made regarding the *Triangle Puzzle*. Of the fourteen subjects who gave a correct solution within the ten minutes allowed for the test, ten were ranked among the first twenty-five of the group, three among the second, none among the third, and one among the fourth. Since so few subjects succeeded in solving the problem, it is evident that the allotted time was entirely too short; even twenty minutes might with profit have been allowed for the solution. Our results support the conclusions of Lindley and of Terman that puzzles are valuable test material.

Since no one answered the entire test correctly, it is apparent that *Royce's Ring* presents an unusually difficult problem—a conclusion further confirmed by the results of Royce and Johnson and Gregg. The value of the test, especially of the last two parts, is questionable, because most of the students were so surprised at the outcome of the first cutting that their subsequent answers were mere guesses.

The efficiency of the *Completion Test* would in all probability be increased if a fore-exercise were given, as has been suggested in the case of Word-Building, since some of the subjects did not pause to read the instructions carefully.

Economic Prophecies is among the most reliable tests of the twelve from the standpoint of the extent of correlation with the final group rank. Its low correlation with the Chain Puzzle, .24, is not surprising in view of the large number of ties in the latter test.

The *Code Test* seemed to be much enjoyed by many subjects, but the results do not indicate that it is of especial merit in testing originality, although it necessitates, as Healy states, close attention and steadiness of purpose.

The *Invention for Sheet Music* ranks second in its differentiation of the entire group in respect to the first and the last twenty-five subjects. Some of the inventions suggested were exceptionally well planned and seemed to be entirely practicable.

Novel Situations is second in extent of correlation with the final group rank. Since the mental activities required in response to the tests are similar to those involved in Economic Prophecies and the Invention for Sheet Music, it is interesting

to note that the three tie in average merit and are among the most effective tests. This result is gratifying, since they were among those devised in our laboratory.

It is evident that the tests, because of their varied nature, could not possess equal value as tests for originality, yet all would appear to test some phase of this trait.

Inspection of the original scores reveals the fact that if three very typical tests, namely, Analogues, the Chain Puzzle, and Economic Prophecies, had been employed, only three subjects would have been thrown out of the group of the first twenty-five, and only four out of the group of the fourth, twenty-five in the amalgamated rank-order. It is thus evident that the employment of these tests alone would have differentiated the group in a manner similar to that accomplished by the use of all the tests.

Finally, it is interesting to note that the inventor did not give exceptional evidence of originality in his response to the tests, though he ranked within the first half of the group. While it would have been most gratifying if his record had been high in every instance, for two reasons his showing in the tests does not invalidate their claim to be tests for originality. In the first place, his age may have prevented his making an unusual record; he was a man past middle life, while the students were all, with a possible exception, under thirty. In the second place, it may very well be that innately he is not unusually original, that his success in invention has come partly as a result of circumstance, and partly as a result of persistence and exhaustiveness of method. He says: "I do not know that I am particularly original; needs have accidentally been brought to my attention, and I have sought to meet them." He made no important invention until his twenty-eighth year, when his attention was called to the need for a practicable time stamp, which he very shortly devised; another success some time later encouraged him to devote much of his time to invention. Thus, accident appears to have been influential in stimulating his inventiveness, while industry and perseverance have contributed to his success.

A TENTATIVE STANDARDIZATION OF A COMPLETION TEST

WALTER R. MILES AND JULIAN E. BUTTERWORTH

The study supervised and the report edited by Professor Irving King, University of Iowa

The aim of the following study was to determine as far as possible the relative difficulty of the various elisions of one of the widely used completion tests, "Where the Dandelions Went." It will often be desirable to have such an evaluation of the separate blanks, if the test is used for anything but the roughest of measures. If a time limit is set for the test which will not permit of its being finished there must be some method of scoring what is done in terms of the difficulty of the various parts. The correction of errors also requires a definitely determined series of weights for the various elisions or blanks.

This particular test was selected, not as being superior to others, but simply to illustrate a method of evaluating which may be applied to any test of this character.

Hitherto, most of the users of such completion tests have tended to assume, in practice, at least, that each blank space is of equal value with every other blank. Ebbinghaus, for instance allowed 1.0 for each elision properly filled and for each failure to fill an elision .5 was deducted. He also deducted 1.0 whenever an elision was improperly filled. Terman and Childs who used a similar completion test (The Strength of the Eagle) in their "*Tentative Revision and Extension of the Binet-Simon Measuring Scale of Intelligence*"[1] recognized on the other hand that all parts of the selection are not of equal difficulty. They therefore modified it by printing all the blanks of equal length, thus giving no suggestion of the length of the word or part of word to be supplied, and further, they divided the selection into approximately four equal parts, the first part mutilated to the extent of 33 1-3%; the second, 45%; the third, 54%; and the fourth, 66 2-3%. In scoring, each elision, if correctly supplied, was given a credit of 6, 8, 10, or 13, accordingly as it occurred in parts I, II, III, or IV of the test.

The present investigators felt that the difficulty of any particular portion of this test is not so much dependent upon the

[1] JOURNAL OF EDUCATIONAL PSYCHOLOGY, Vol. III, p. 198ff.

degree in which words are omitted as upon the nature of the omissions. For instance, elided verbs are less easily supplied than elided adjectives or adverbs.

The reader may here raise the objection that it is scarcely worth while to evaluate accurately every omission in a completion test; that it should be sufficient to rate a set of papers according to the fractional part of the whole performed. If the test is expected to yield only a very rough measure, such a procedure would undoubtedly do well enough. But the results of the test have seldom been interpreted as merely rough measures. Usually the investigator attempts to assign to each paper a definite numerical grade. If, however, the omissions are not of equal difficulty it would seem that comparisons or correlations based on grades determined on the basis of the equal difficulty of all elisions, should be open to serious question.

Whether it is worth while or not to attempt the careful evaluation of a completion test, such as is here proposed, this study will show at least two things: First, that it is possible to assign fairly accurate values to the different blanks of such a test, and second, that a numerical grading means very little if it does not take into account the relative difficulties of the different elisions. We might also mention as a third point that our study shows how complicated even the so-called simple tests are.

The data for this study were collected in the spring of 1912 from twenty-five observers, nearly all of whom were men, and who were students or members of the faculty in the State University of Iowa. If twenty-five such selected observers seem to anyone to furnish an unsuitable basis for the standardization of such a test, it is hoped that the number will at least be sufficient to furnish a suggestion as to a method of approach which may be feasible in a more extended inquiry.

The subject in each case sat at a desk conveniently lighted. Nearby one of the experimenters had a muffled telegraph key for signalling to his colleague who was attending a suitable time recording apparatus in an adjoining sound proof room. The subject, after reading a set of written instructions,[2] was given a sample mutilated text, which served for him both as instruction and practice. The real test blank was placed face down on the desk and on a signal was turned over and the blanks were filled in by him.

[2] Instructions are given in the appendix.

The sentence was used as the working unit. There are eleven of these sentence units in this test, and the average of the times of the twenty-five subjects necessary to complete each unit are as follows, in percentages of the time required for the whole test:

Value of unit				
	1	12.8%	6	10.8%
	2	11.7	7	9.2
	3	8.5	8	7.8
	4	11.0	9	8.3
	5	11.2	10	5.2
			11	3.4

As might be expected, the mean variation from the average time taken for each unit is in every instance rather large, emphasizing the need of a larger number of observers. The following table gives the percentage in the case of each unit which the average deviation was of the average time.

Unit				
	1	51%	6	50%
	2	55	7	29
	3	47	8	47
	4	39	9	55
	5	33	10	42
			11	32

In order to determine the average difficulty of the different words within each unit the subjects were asked, as each unit was completed, to distinguish three degrees of difficulty in the words supplied. They were asked to do this by underlining once and twice those words which seemed of more than average difficulty and those which seemed especially difficult respectively. The time required for doing this was not large but it was measured and deducted from the total time for the test. The relative difficulty of each elision was then estimated by the frequency with which it was marked by all subjects as of one of the three degrees of difficulty. There were, of course, considerable differences among the observers as to the relative difficulty of the various words. The first five words of the test are typical and were marked thus by the twenty-five observers:

Elided word	1	2	3	4	5
Average difficulty.....	21	21	24	19	24
More than average difficulty.....	3	3	1	4	1
Very difficult.....	1	1	0	2	0

The question which was next considered was what value should be assigned to a word of more than average difficulty and what to a word of great difficulty in proportion to the value of the word of average difficulty. At first thought, one may be

tempted to assign such arbitrary values as 1, 2, 3, or 1, 2, 4, or to say that very difficult words are so many times as hard as words of average difficulty, and that words of more than average difficulty should be assigned a value about midway between the two extremes. Introspection, however, seems to indicate that the words of great difficulty are more than three or four times as hard as the average words. It usually happened that the observer took as much time to determine a single hard word as to arrive at a solution of all the rest of the unit, and it frequently happened that even more time was spent on one hard word than on all the rest of the unit.

Now, if most of the words in the whole test had been marked as *very difficult*, only a small value, on the basis of 100% for the whole test, could have been given each word, no matter how much time it took the observer to settle upon it as the right word. On the other hand if few words were so marked, a relatively higher value could and probably should be assigned to each word marked as very hard. In other words, these three degrees of difficulty are purely subjective degrees determined by each observer, and hence the less frequently words are marked as of more than average difficulty, the more difficult they probably are compared with words of average difficulty, and the more value they should be assigned in comparison with the easier words. Hence the conclusion that the best method of assigning the values to the different blanks of the test should be based on the frequency with which each degree of difficulty was specified by the different subjects.

In answer to the possible criticism that this method is invalid because each subject's standard of difficulty would be likely to change in the course of the test, we may say that while it is probably true that few words of great difficulty were of exactly equal difficulty, it must be remembered that the subject could always tell when the solution went easily, when it was very difficult, and when it was moderately difficult. At least it seems that this method should give us more nearly the correct values than those we should get if all elisions were assumed to be equally difficult.

Acting, then, on the assumption that our method of assigning values to the three grades of difficulty is admissable, we next combine the records of all our subjects and have the following percentages of frequency:

83.2% of the elisions were marked as of average difficulty.
9.3% of the elisions were marked as of more than average difficulty.
7.5% of the elisions were marked as very difficult.

On the basis of frequency we may say that the very difficult elisions are 11.1 times as difficult as words of average difficulty, (83.2 ÷ 7.5), and that words of more than average difficulty are 8.9 times as difficult as words of average difficulty, (83.2 ÷ 9.3). For convenience these proportions should be reduced to fractions of unity, as follows:

Elisions of average difficulty	.048
Elisions of more than average difficulty	.427
Elisions of greatest difficulty	.533

Now the frequency with which each elision in the first unit was indicated by the observers as of the various degrees of difficulty was as follows:

Elision No.	1	2	3	4	5	6	7	8	9	10	11	12
Average difference	21	21	24	19	24	24	21	14	20	18	18	17
More than average difficulty	3	3	1	4	1	1	3	5	3	4	2	5
Very difficult	1	1	0	2	0	0	1	6	2	3	5	5

If now we substitute for these frequencies the values for each degree of difficulty as indicated above, we have the following results

Elision No.	1	2	3	4	5	6
Average difficulty	1.008	1.008	1.152	.912	1.152	1.152
More than av. difficulty	1.281	1.281	.427	1.708	.427	.427
Very difficult	.533	.533	.000	1.066	.000	.000
Totals	2.822	2.822	1.579	3.686	1.579	1.579

Elision No.	7	8	9	10	11	12
Average difficulty	1.008	.672	.960	.864	.864	.816
More than av. difficulty	1.281	2.135	1.281	1.708	.854	1.281
Very difficult	.533	3.198	1.066	1.599	2.665	2.665
Totals	2.822	6.005	3.307	4.171	4.383	4.762

Therefore, the percentage of value (computed on the basis of 100% for the unit) due each elision of this first sentence is: 7.14; 7.14; 3.99; 9.35; 3.99; 3.99; 7.14; 15.19; 8.38; 10.56; 11.09; 12.05. But, since this first unit of the test is entitled to only 12.8% of the credit of the entire test, it is desirable to reduce the above determined values to a basis that will render them directly comparable with the values of all the other units of the test. This we have done by taking 12.8% of each of the values belonging to this unit. We thus obtain as the real values for

each of the twelve elisions of this unit the following: .9; .9; .5; 1.2; .5; .5; .9; 1.9; 1.1; 1.4; 1.4; 1.6.

The procedure which has been given in detail above for the first sentence of the test, was followed in getting the real values of the elisions in each of the other units. The values thus computed are given below inserted in the blanks of the test itself.

Wh.9 Willy .9 two .5 old he 1.2 .5 .5 red farm-h.9 1.9th 1.1 yard 1.4 front .14 1.6. The dan.7 were 1.5 th1.8 there; so that 1.6 2.0 lo2.2 yellow instead of 1.9.

One bright .4 Willy's m.6 put 1.7 1.6 straw .7 .9 sent him .7 .6 .6 yard to .7. She knew 1.2 1.5 had .8 high 1.3; and .4 could not o1.0 .4 gate; so he 2.2 2.3. W.5 it .3 time .5 him .3 8. .3 nap and 1.0 went .5 c.7 him, she noticed that .4 gr1.3 ma1.6 of the da.9 1.1 1.5. She won.7 where 1.3 1.1; but, as 2.2 1.2ld not talk much, 1.1 did not 1.5 him 1.7 them.

A short .6 after, while .4 was 1.1 .7 his crib, his mamma went .9 1.6 1.8 1.2 wa1.0. When .5 buck.7 came .9 full 1.0 2.2 1.6 top was all y.4 with .5. Look.8 down into .8 1.4 .6 could .6 no 1.1 at all, on1.3 1.7. 1.1 1.1 .9 wonder, then, where .5 blos.4 had 1.2. Willy .3 been .4 busy try.3 .3 fill .5 .7 .9.

If the reader will take the trouble he may compare his own introspective judgments of the difficulty of the various elisions with the values here assigned. He should remember, however, that the judgments of a single individual will frequently differ from these values which represent the combined judgments of twenty-five individuals.

It was the original purpose of the writers to correlate the degree of difficulty with the degree of correctness in the assignment of final values to the various elisions. While both of these elements must be considered in the marking of any paper, the writers decided, finally, to leave these two elements, difficulty and correctness, separate. There seemed to be no way of determining the time that would be required to make each observer's work absolutely correct. This being true, it seemed safer to base the value of the elision only upon the combined introspections of the subjects as to their difficulty than to assume some arbitrary relationship between difficulty and correctness.

Since accuracy should be considered in using the table of values here presented, we suggest two possible methods of doing it. First, give no credit for what is not correct or as good as correct. Second, give full credit for what is correct or as good as correct, and part credit for what gives sense but is not strictly correct. In neither case would credit be given for elisions left unfilled or for those filled so as to have no connection with the rest of the thought. We believe that the second method is the

fairer. An elision or a group of elisions may be so filled as to be not entirely unrelated to the rest of the thought, and yet not be sufficiently correct to warrant full credit. Thus the seventh unit, when correctly filled in, should read:

"She wondered where they were; but, as Willy could not talk much, she did not ask him about them." One observer filled it in to read thus: "She wondered where they were; but, as Willy could not talk much, *they* did not *call* him *before* them."

Then again, what proportion of the value of an elision should be deducted for words such as these in italics, which give sense but are not correct? Either of two methods might be followed: (1) an arbitrary value, say, one-half, might be deducted; (2) a credit proportional to the accuracy of the words could be assigned. The aim of the first method is to average all degrees of correctness, assuming that in the long run one word will be as much better than this arbitrary value as another is less. The second method aims to make the assignment of value a matter of individual judgment. If the papers contain many errors, we believe that the second method of evaluating would be the fairer. However, in the case of the papers used in this study there were so few errors that the first method of dealing with mistakes was adopted. The difference in the results produced by the two methods applied to our papers would be very slight. It is easily possible, however, that with some papers the results would be very different, and where this is the case the second method should be selected as the better.

We believe that the more accurate results which may be secured by using a table of individual values for the various elisions based upon the method herein described is sufficient ground to justify the little additional labor that will be required to use or apply them.

It must be remembered that the values of the various sentence units and of the various elisions which are here suggested are based on the reactions of scholastically advanced adults. It is a question whether the proportions of difficulty would remain the same if less mature subjects were tried out in the same way with the test. We have one bit of evidence to support the view that difference in maturity and in scholastic standing would yield much the same relative values. One of the investigators, Dr. Butterworth, the following winter gave this same test to one hundred first year normal school girls as a mass test. They had tried on the previous day the completion test called "The Strength

of the Eagle," to give them some familiarity with this sort of exercise. The units were separated by red lines and each subject was provided with a piece of notched card-board so that she could cover up all of the test except the unit on which she was engaged. All observers began on each unit at the same time and as each finished she raised her hand and was given her time by the experimenter from a stop-watch. Although some time was lost in the raising of the hand and the getting of the time, it was very nearly equal for all subjects. The times needed by the hundred subjects for each of the units were thus secured and averaged and percentage values of the various units were computed in precisely the same way as those given on page 4, above. The values last secured from the hundred girls are strikingly like those obtained by more accurate methods from the twenty-five more advanced subjects in the University of Iowa. Both sets of values are here presented for comparison.

	University subjects	First year normal school girls
Unit 1	12.8	10.9
2	11.7	14.8
3	8.5	9.2
4	11.1	11.7
5	11.2	12.6
6	10.8	8.5
7	9.2	9.6
8	7.8	6.4
9	8.3	7.9
10	5.2	4.9
11	3.4	3.6

APPENDIX

Instructions given to all subjects to read before beginning the test.

The Completion Test

The observer will supply all missing words or portions of words. The length of each dotted line shows approximately the length of the word or portion of a word to be supplied.

Try first to make sense, second to fill in every omission, third, to work as rapidly as possible.

Finish one unit or sentence at a time. These are marked off by red lines.

Be rather certain before beginning to write.

After finishing each sentence, immediately underline the words which gave difficulty. Place two under any word or words which gave you noticeably the most difficulty in the sentence.

The title of this story in which you are to fill omitted words is "Where the Dandelions Went."

PSYCHOLOGY IN THE SCHOOLROOM[1]

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Our educational psychologists, whose chief purpose is the solution of educational problems with the aid of psychology, have treated their subject under psychological headings such as instinct, memory, thinking, fatigue and individual differences. I believe that a mode of treatment employing educational or a combination of educational and psychological headings, would make educational psychology more practical in character and of more value to the teacher for whose use it is primarily intended. Instead of a chapter on mental fatigue, there should be a chapter on the daily program and fatigue. A chapter on attention should be replaced by discussions of the conditions of attention for the different kinds of school work, and these discussions should appear under chapters on the psychology of reading, the psychology of writing and the psychology of every other school subject. A single volume on educational psychology should give way to a number of volumes dealing with the contributions of psychology to each one of the main divisions of education respectively; e. g., the history of education, the principles of education, school administration, school management, school supervision and the principles of teaching. In this paper on "Psychology in the Schoolroom," I shall discuss, in a general way, the psychological contributions to the divisions of education just enumerated, because these divisions are all involved in the work of the schoolroom, without which they would have no purpose.

While theoretical or general psychology may be of service to the educator, it has no direct solution for the problems which arise in the several divisions of education. This is due to the fact that the purpose of general psychology differs from that of education. It is the purpose of general psychology to analyze, describe and explain mental processes, but it is the purpose of

[1] Read before the Superintendents' and Principals' Section of the Colorado State Teachers' Association, November 5, 1915.

education to improve the efficiency of these processes for schoolroom tasks. Psychology, directed by its purpose, deals with relatively simple mental and physical activity, often under laboratory conditions, but education, under the influence of its purpose, deals with complex activity under schoolroom conditions. For example, the psychologist is concerned with the more or less simple activity of the association of ideas, but the educator is concerned with the complex act of reading. The knowledge of association which the educator receives from the psychologist, constitutes only a starting point for determining the various associations involved in reading, and the most favorable conditions for bringing them about. In a similar manner the educator receives but a start from the psychologist for dealing with all of the other mental processes which are involved in a more or less complex way in the tasks of the schoolroom.

Child psychology has much more to contribute to the solution of educational problems than general psychology, but its purpose also is not identical with that of education and so it falls short of supplying enough educational psychology to meet the demands of the schoolroom. The child psychologist endeavors to discover the make-up of the child's mind, the nature of its development and what occurs in it, but the educator seeks to know how the mind of the child should be treated in order to realize the aims of education in the best possible way. The child psychologist wants to know the natural development of the child's mind, but the educator wants to know how to interfere with this natural development so as to reach definite educational ends. The psychologist studies the child as he is, but the teacher tries to find the best methods of changing him into what he ought to be. These differences in purpose separate the problems of the psychologist and the teacher, and make it necessary for a third individual, the educational psychologist, to study schoolroom problems with the aid of psychological knowledge.

Most of the help which education gets from general psychology, it receives indirectly through educational or pedagogical psychology. This branch of knowledge could not have been developed without general psychology as a basis or starting point. In the first place educational psychology inherits from general and child psychology a knowledge of the nature of mind, and in the second place it uses the means and methods of investigation

which are those of modern psychology. We may say, in general, that practically all the progress made in present day psycho-educational inquiries, rests upon the development of modern psychology and its methods of investigation. As to the extent to which education is dependent upon educational psychology, there are differences of opinion. Some educators believe that scientific pedagogy or education is nothing but educational psychology, but on the other hand there are educators who believe that all educational problems can be satisfactorily solved without the aid of psychology. They are of the opinion that logic, sociology and educational practice are sufficient for the resolution of all educational difficulties. Both of these views are undoubtedly extreme. The truth lies somewhere between and may be expressed in the following words: every division of education has problems whose best solution requires the assistance of educational psychology, which in some cases plays the major and in other cases a minor role.

Taking the divisions of education as enumerated at the outset, I shall endeavor to show that psychology whether general, child or educational has played a part in answering many of the questions which have arisen in each of these divisions. Students of the *history of education* are aided in several ways by a knowledge of psychology. As the history of education is suffused with psychology, psychological knowledge is helpful in the interpretation of the history of education. It is also helpful in the separation of sound from unsound teachings in the educational theories of the past; e. g., those of Pestalozzi, Froebel and Herbart. According to modern educational psychology, Herbart made many errors in his system of education. By making instruction in form preparatory only to the studies of geometry and geography, he very much under-rated the value of a knowledge of form for many activities and for such studies as drawing, reading and writing. He also made an error by beginning his instruction in form with the triangle in preference to the rectangle, which is in reality more easily comprehended by children than the triangle. In the training of right conduct, he over-emphasized the importance of the circle of thought and moral insight. In this kind of training modern psychology emphasizes practice in right action and in conduct with self-approved motives as of most importance. These are but a few illustrations

of how psychology can be of service in selecting the good and rejecting the bad in the history of education.

The *principles of education* deal primarily with the aims and the content or materials of instruction. What the aims and content of education shall be is chiefly determined by social needs and conditions, but there has been frequent recourse to psychology in the discussions on the curriculum, especially when its disciplinary value was under consideration. The formal or disciplinary value of mental work is so intimately connected with psychology, that a change in psychological conception was followed by a change from an undue belief in the formal value of school subjects to an unwarranted disbelief in their formal value. When the educational atmosphere was pervaded by faculty psychology, it was respectable for an educator to say that the larger part of the curriculum had the sole purpose of mental training. But with the passing of the faculty theory and with the appearance of the dogmatic writings of James, Thorndike and others, it has become impossible for a person to express a belief in formal training and still be respected as an educator. In recent years psychology has contributed a fairly extensive literature to the subject of the formal training of the mind, quite enough to show that the subject presents problems which are by no means easy of solution. It has also shown that the older interpretation of the doctrine of formal mental training was too radical, and that the more recent reaction to the older interpretation is decidedly extreme. Valuable psychological contributions to the subject will continue to be made until it is better understood. Meanwhile, the safest procedure in practice is to select the subjects of the curriculum for their content value and to teach them for both their content and their formal values. I believe the future will show the formal value to be greater than the content value in the elementary school. At present no one should entertain radical views on the subject of mental discipline.

I should like to call your attention to another problem, properly belonging to the principles of education, in the solution of which psychology has rendered valuable assistance. I have in mind the problem of the completeness with which the ideal aims of education can be realized in practice with certain classes of children. Psychological studies on the mental endowments of children have made it clear that, if the school is to do its work

economically and well, it must not even strive to attain for all classes of children the ideal aims of education. There are classes of children in the public schools for whom the aims must be very low, such as training in right conduct, but not in the comprehension of right and wrong; or training in weaving mats, caning chairs, and mending boots, but not in reading, writing and arithmetic. Investigations on the endowments of children have also shown that there should be specific aims in education for those children who have either superior or very different capacities from the rank and file. If these differences in aims are to be respected in practice, there must be a marked difference in the materials of instruction used for the various classes of children. It is impossible for children to cane chairs with the multiplication tables, nor can they weave mats with crayon and blackboard. For the progress that has been made in adapting the ultimate aims of education to the children's endowments, education is substantially indebted to psychology.

Psychology assists education in determining not only what the final possibilities of certain classes of children are, but also in determining what most children can do at different stages of development and what means of instruction are adapted to them during these stages. Whether paragraphing in composition work or solving a given kind of problem in arithmetic can be taught economically and profitably in a given grade, depends upon the stage of development and the mental endowment of the average child of the grade. For this knowledge education is dependent upon child psychology. To teach children in the first grade those things which involve a comprehension of long stretches of time is, according to child psychology bad and wasteful. The sense of time develops slowly and only through life experiences. There are some children in the first grade who are unable to distinguish between morning and afternoon. To introduce into the lessons of these children the time concepts of week, month, season and year would certainly be worse than useless. I shall use drawing ability for another illustration. Child psychologists tell us that before the fifteenth year, most children are unable to represent form in its completeness. Such work should therefore not be required of children before they have reached the eighth or ninth grade. To try to make the children in the third grade give a complete graphic expression of

form, would be very much like trying to make a two months' old baby walk. Instruction which is constantly devoted to teaching children the things for which they are not ready and the things which they already know must, of course, be barren of results.

School administration is chiefly concerned with the external affairs of the school such as attention to financial matters, supplying all kinds of equipment, selecting teachers and school officials, fixing the length of the school term and the attendance requirements, establishing schools and checking up the efficiency of the school system. In many of its phases this division of education is not helped by the psychologist, and, in some of its phases, his teachings must be ignored on account of other factors. For example, according to the teaching of the psychologist, children should be required to attend school beyond the age of fourteen years, because before this age they are not sufficiently developed to have excellent learning ability. On account of social conditions, however, most school systems have found it impracticable to follow the counsels of the psychologist, for they allow the children to leave school at the age of fourteen. In other phases of school administration, psychology plays a more or less prominent part. Studies on the mental fatigue of school children have shown that evening schools are unprofitable for children who work hard all day, and in this way psychology has had some effect upon the elimination of these schools.

Psychology is making its most important contribution to school administration by the help it is giving to the development of means and methods for determining the efficiency of a school system. One method which has been extensively employed and which psychology has helped to develop, finds the amount of pedagogical retardation in the school system. Assuming that the grade requirements of the different systems are about equal, that system would be the poorer which showed the largest amount of retardation. The first statistics on pedagogical retardation were published in 1907 in the April number of *The Psychological Clinic*. This journal and the psychological department of the University of Pennsylvania, have done more than any other agency to develop methods for determining the amount of retardation in a school system and for bringing the results of retardation investigations before school officials.

The efficiency of school systems has also been determined by means of the school survey. This may be so general as to involve every phase of the system, or it may be more specific in character. One survey may be entirely devoted to the subject of school sanitation, another to the subject of writing, another to arithmetic, and so on. For the purpose of measuring the quality of the children's work in some of the school branches, use has been made of standards or scales of measurement for the development of which education is indebted to psychology and the writings of such psychologists as Thorndike and Starch. There are of course superintendents who oppose the employment of these standards in making school surveys with the statement that they are worthless. That they are far from perfect every one is willing to concede, but that, even in their present form, they are useless is not acknowledged by those who have worked with them. Perhaps the opposition to them by a few politically minded superintendents is the best evidence of their usefulness. In general, psychology has been instrumental in developing methods of book-keeping for the schools which have already been widely employed.

Scales for measuring the quality of school work may indirectly be of service to school administration by improving the possibility of finding the best teachers. Other things being equal those teachers would be the best whose pupils showed the greatest efficiency in their school work. The consciousness of this possibility might have a wholesome influence upon the efforts of some teachers in practice, as well as upon the efforts of some of those in training. Extensive measurements of children's school work might even be used for evaluating the higher educational institutions devoted to the training of teachers.

The purpose of *school management* is to secure such conditions of health and school organization as are most favorable to learning and instruction. It pays attention to absences and tardiness, to the hygienic conditions of the school, the health and defects of the school children, the arrangement of the daily program, the maintenance of order and discipline in the class room and in the school in general, the requirements of home work, the gradation and classification of children, the system of promotions and provision for individual and departmental work.

Psychology is involved in the solution of some of the problems of school management. Studies on the mental fatigue of school

children render assistance in the arrangement of the daily program. They help us to determine the order in which the several school branches should be taught by giving us some idea of their fatigue coefficients and of the time of day when children do either their best or their poorest work. Studies on fatigue also give us a basis for finding the right length, number, and filling of the recess periods for children of different ages; for finding the effect of long and short recesses upon the child's fitness for work; for adapting the schedule and individual requirements to different types of fatiguability; for determining the ill consequences upon health and mental development of the child; for finding out what may be gained from a change in the kind of work, and much more of a similar nature.

Psychology, especially clinical psychology, has enhanced the efficiency of school management by pointing out the relation between certain physical defects and mental development, and by devising some of the means and methods for detecting physical defects under schoolroom conditions. Among these defects are carious teeth, arrested phsyical development and growth, enlarged and diseased tonsils, adenoids, defects of the nervous system, faulty nutrition and defective sense organs. The knowledge that such defects may arrest mental development and retard school progress, has encouraged school management to make greater efforts towards their prevention and amelioration or cure.

The grading, promotion and classification of children have received increased and favorable attention through the influence of studies in psychology that deal with the retardation and endowments of children. In many cities the lock-step system of promotion has been broken up through a realization of the fact that it retarded both the bright and the dull child; and special classes and schools have been established in recognition of the widely different endowments of children. Psychology has not only emphasized the need of a better grading and classification of children, but at the same time it has evolved means and methods for realizing this need. Among them are the Binet-Simon and The Point Scales for measuring intelligence, and the method of studying the family and developmental histories of school children.

As the main function of *school supervision* is to improve school practice through overseeing matters of management and methods

of instruction, I shall assume that this division of education has received consideration under the headings of school management and principles of teaching.

The *principles of teaching* are concerned with a more or less direct control of the child's moral and intellectual responses by the teacher, through the materials prescribed by the principles of education. In this field psychology has, undoubtedly, rendered its most valuable service to education. Through its analysis of many of the school subjects, such as reading, spelling, writing and arithmetic, psychology has furnished education with the necessary foundation for developing the proper methods of teaching these branches. Moreover, by supplying methods for getting at the status of the individual capacities of the child, psychology has made it possible to discover and improve or cure the specific weaknesses which so many children exhibit in reading, spelling and other school work. Among these weaknesses are poor powers of observation, poor memories, poor phonetic sense, speech defects and poor synthetic ability along one or more lines.

Such principles of teaching as may be employed in practically all kinds of school work, are also in part dependent upon psychology for their development. In a paper of this kind it would, of course, be impossible to enumerate many of these principles and show their dependence upon psychology. I shall, therefore, mention a few which are derived from studies on the psychology of learning. In drill work the repetitions should be well distributed in time, for investigations on learning have shown that this gives better results than when many of them are made in succession. Class work and seat work should be carried on as rapidly as is consistent with getting the meaning, because psychology has found that such a procedure may in the course of a few months quadruple learning ability. In studying a selection, it should be read through as a whole, because most psychological investigations on this subject indicate that this gives better results than studying it part by part. After having learned something the attention should not immediately be given to something else, because psychology maintains that this is apt to impair the retention of what was just learned. Many more principles based upon memory and other phases of psychology might be enumerated.

The subject of controlling the moral responses of children has received attention from psychology. For example, lying has been rather carefully investigated and many important results have been obtained. A teacher who has not studied the nature and causes of lying as determined by psychology and the methods of controlling it, is not as efficient as she might be in the moral instruction and training of her pupils. Many other moral reactions, as well as lying, have been given fruitful consideration by psychologists. Their studies on the relation between morality and heredity and between morality and intelligence have been especially significant and helpful to the schools and society at large.

Both good teaching and good discipline are dependent upon a knowledge of the many individual differences which appear in children, and these have been extensively treated in psychological literature. The teacher who does not know that some children have good temporary and good permanent memories and that others have good temporary but poor permanent memories, is unlikely to conduct recitations in the most efficient way. She will not realize that the former need be given very little attention and that the latter should be questioned primarily on previous lessons rather than on those assigned for the day. On account of the individual differences in the maturity for doing certain tasks, one of the large problems of the teacher is to adapt the materials of instruction to the stage of the child's mental development. This problem in its larger or group aspects evidently belongs to the principles of education, but in its minor or individual aspects to the principles of teaching. For example, the materials of instruction which are adapted to most of the children in a given grade should be discussed in the principles of education, but the materials which are best for some of the principals of the grade must be determined by the teachers.

I have tried to give you a glimpse of what psychology has done and promises to do for the work of the schoolroom. Already there is much more educationally valuable material in the field of psychology than actually finds its way into the schoolroom. The reason for this is not far to seek. It is impossible for teachers, principals and superintendents to become familiar with all of it. They could not, in connection with their prac-

tical work, make the best possible use of psychology in the schools, even though their studies were confined to psychology alone. But when we bear in mind that they must study education in its various phases, hygiene, logic, biology, sociology and a number of academic subjects, we can easily understand why they do not carry much psychology into the schoolroom. If the schools are ever to get the fullest benefit from psychology, they must employ specialists who have been trained in the use of psychology for the solution of educational problems.

COMMUNICATIONS AND DISCUSSIONS

MENTALITY TESTS: A SYMPOSIUM

(Concluded from the May number.)

1. *The point scale method versus the age-grade method.* I find myself unable to concede to the point scale method a single one of the numerous advantages which have been claimed for it. I do not see that the Yerkes-Bridges point scale, in particular, furnishes any real contrast, except in minor and unessential points, to the age-grade method of Binet. The point scale is itself an age-grade method, for its results have no known or ascertainable significance until they have first been interpreted in the light of age norms and in terms of the intelligence quotient.

Even if a point scale were desirable I do not believe it can be shown that the manner of deriving the Yerkes-Bridges scale is either logically or psychologically defensible. From the psychological point of view, especially, the arbitrary assignment of point values seems to me to have been objectionable in several respects. A point scale which is to possess any serious claim to superiority must be framed with some regard for the equivalence of points, and as far as this desideratum is concerned I believe that a more valid point scale than any yet available could be derived in less than two minutes by merely assigning two points to each test in a properly revised Binet scale, or for that matter by simply using the intelligence quotients derived by the Binet method as points for a point scale. The logical fallacies of the Yerkes-Bridges scale and the possibility of devising a really valid *equal-point scale* will be treated at some length in a forthcoming article by a Stanford University student.

All of us, doubtless, are equally desirous that any intelligence scale, old or new, shall stand or fall according to its intrinsic merit. A comparative evaluation of two intelligence scales, however, is no light matter. It requires more than off-hand criticism, more even than a little investigation or two. The proposal to decide the matter "by agreement" can of course not be taken seriously. Scientific disputes were settled that way by the churchmen of the Middle Ages, but the method is a little out of date now. When suitable revisions of the

Binet scale have been thoroughly tried out alongside of newer scales I predict there will be an end to the proposals to "scrap" the method as obsolete. Anyway, progress in this field will come, not from psychological decree, but from the demonstrable results of scientific research.

Present work at Stanford University. Until recently our time here has been taken up with work on the Stanford revision of the Binet scale. This has now been completed and will appear shortly in a monograph and a Guide to be published separately. The monograph will be devoted to an analysis of the results of 1,000 tests of unselected children, and will contain the following chapters: The distribution of intelligence; The validity of the intelligence quotient; Sex differences; The relation of intelligence to social status; The relation of intelligence to school success; Considerations relating to the formation of an intelligence scale.

The Guide, which will be issued by Houghton Mifflin Co., will contain an untechnical exposition of the Binet method and an amplified guide for the use and interpretation of the individual tests. The chapters are as follows: I. The uses of intelligence tests; II. The sources of error in judging intelligence; III. The Binet-Simon method; IV. The nature of the Stanford Revision; V. An analysis of 1,000 intelligence quotients; VI. The significance of various intelligence quotients; VII. The reliability of the Binet scale; VIII. General directions; IX–XX. Guide for use of the individual tests. The latter volume will appear about June 1st.

At present we are at work on a new scale. Some 20 sets of serial tests of widely varying nature have been assembled. In its present form this material is so extensive as to require from three to five sittings with each subject. A preliminary try-out is now in progress, from the results of which we hope to be able to select enough tests out of the entire mass to make one or possibly two or even three scales. The plan of the investigation is one that will permit the use of the same results for the formation of three types of scales—one like that of Binet, an *equal-point scale* for general intelligence, and several serial scales for separate functions. Since all of these are to be based on the same test results, it will be possible to ascertain the relative value of the different scales so derived.

Apart from this we are using the Stanford revision in studies of racial differences, of the growth rate, and of intelligence of twins, delinquents, and superior children.

The oulook for mentality tests. I believe that mentality testing will continue for some years to be mainly intelligence testing. At present this is the field which offers the largest returns for a given expenditure of effort. Moreover, after further exploration in this line we shall have a more secure basis for mentality testing of the more inclusive sort. We must not forget, too, the overtowering importance of intelligence as a factor in determining the individual's educational, social, and vocational possibilities. Largely for lack of the guidance which intelligence tests can give us, our education is a mixture of guesswork and patch-work; the data gathered by the use of pedagogical scales are equivocal; social classes and races are misunderstood and misjudged; and attempts at political and social reform go wide of the mark. I believe that social and racial psychology in particular will soon have to be rewritten in the light of results which will be secured by the use of intelligence tests.

Another important problem, perhaps the most urgent of those which promise early solution, is the determination of the growth rate. It is on this that the possibility of predictions wholly depends. I believe that in the near future it will be possible, after a brief test of even a young child, to forecast the later course of such child's mental development with a degree of accuracy as yet unthought of.

Who shall use intelligence scales? Although I am fully in accord with the recent action of the American Psychological Association in the attempt to discourage the use of intelligence tests for strictly diagnostic and research purposes by persons without extensive psychological training, I am no less equally convinced that there is no reason why every prospective teacher should not be taught how to use the Binet or some other system of standardized intelligence tests for the purpose of arriving at a better understanding of her pupils than would otherwise be possible. The technical knowledge and skill necessary for this purpose can, under the proper instruction, be acquired in ten weeks by anyone who has intelligence enough to teach school. It goes without saying that such a brief course of training does not fit one to use the tests for purposes of research or serious diagnosis, but my own experience has taught me that this is sufficient to enable the teacher to get results which, with ordinary school children, do not differ materially in one case out of twenty from those secured by the most highly trained expert. I think we must agree that a good deal which has been said *à propos* of psycho-clinical expertness (whatever that is) as a prerequisite for using the Binet

scale is hollow buncombe. As a matter of fact, there is no argument in favor of limiting the use of intelligences tests to trained psychologists which does not apply equally well in the case of pedagogical tests like those of Courtis, Ayres, Thorndike, etc. These tests, fortunately for education, teachers are specifically urged to make use of. No one has sought to envelop them in tabus for the glorification or personal advantage of the élite who have been initiated into their mysteries. Let us abandon pretense and take the same common sense attitude toward the Binet scale. When we have taken this attitude I believe we shall find that to understand and apply a well planned and well written Binet guide is as much within the power of the average teacher or school principal as it is to decipher and apply with technical correctness any reasonably complete set of directions for current pedagogical tests. Certainly there should be nothing in such a guide to compare in difficulty with the puzzling features of the Courtis manual.

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Ten years spent chiefly in making mental inventories of men, women and children of many sorts have emphasized for me several facts and problems as important to an efficient clinical application of psychological data. I here present them, necessarily rather tersely, for the consideration of the readers of the symposium.

1. Mental tests are of use in appraising an individual only when the one using them is able to psychologize in reference to the results, only when he is able to translate simple responses into terms of mental process involved, only when he is able to avoid confusing mental content with mental process.

This limitation carries with it the implication that the appraiser of the individual must make the tests himself, or at least watch the procedure, as a response can be fairly judged only as a part of the whole circumstance which produced it.

2. Mental tests are of use in appraising an individual only when a *rapport* is established between the experimenter and the subject. If the subject is intimidated or repelled by the examiner or by the surrounding conditions a true estimate of his ability can not be made. On this account rapid examinations for diagnostic purposes are unjustifiable.

These two facts are not grasped by that large body of public spirited men and women who are making a sincere effort to evaluate the con-

tribution which clinical psychology is offering toward the solution of certain social problems. On this evaluation the clinical psychologist's opportunity for social usefulness in the near future largely depends. It seems the part of wisdom and fairness to let it be more generally known that a mental appraisement of an individual is even more dependent upon the adequate training and quality of the examiner than upon the standardization of the tests used. In further emphasis of the large field in social service now opening before the clinical psychologist I shall add that during the last six months twenty social agencies of Chicago and its environs have sent problem cases to the Orthogenic Clinic at the Rush Medical College for mental evaluation and advice as to course to pursue.

3. In the examination of adult subjects I have long used a series of selected tests designed to given an approximately complete mental analysis. The series is arranged in four sections in accordance with the recognition of three fundamental mental processes—sensation, reproductive memory, and apperception—and their final expression in volitional movements. These sections are subdivided rather extensively, each subdivision being provided with one or more tests. The arrangement is convenient in that tests bringing into play the same mental processes but calling for less mental content may be substituted when necessary.

4. The final Binet-Simon revision of the Binet-Simon Measuring Scale, I have found of unequalled value in diagnosing and classifying defective children. There are of course many cases, especially cases of children with defects as opposed to defective children, to whom this series of tests is absolutely inapplicable. I believe that the series is a valuable tool when used by an adequately trained person, who knows when to use it and when to lay it aside for other more appropriate tools. In less expert hands, far from being a valuable tool, it is even a dangerous one, owing to the popular belief in its innate and almost uncanny power of detecting the subnormal child.

5. I find a distinct need for tests which require the controlled interplay of disparate mental processes, and yet call for no rich mental content. There are many tests for complicated mental activities adapted to persons of culture, but not many which call for equally complicated mental work while making no demand on mental content. Many of our adult subjects are densely ignorant and yet capable of sustained controlled mental effort. We need tests to bring this out.

Tests of learning ability which require practically no apperceptive background are also needed. Such tests are of great value in the examination of those who do not speak our language.

I also find a definite need for tests to determine the ability to oppose suggestion by a critical self-reliant survey of the situation. Extreme suggestibility is the trait which more often than all others brings the subnormal person into conflict with society and with the law.

At present I am endeavoring to develop tests along the three lines just indicated.

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1. One of the greatest needs at the present time in the field of psychological diagnosis is an extensive experimental and critical study of the relative value for purposes of practical diagnosis of the larger number of individual tests which are now available; and, once this value has been satisfactorily determined, we need to establish norms for these tests and to determine the best method of arranging the norms or the tests.

We must determine by critical studies what criteria can be employed for determining the value of the tests which should be included in a measuring scale. Shall we use as a criterion the degree of correlation which exists between different tests or between a given test and the child's success as judged by social or educational criteria? Shall we select the tests on the basis of their elemental character in accordance with Professor Seashore's suggestion? Or shall we prefer the more complex tests, which more nearly resemble the actual complexities of the life situations? Shall we seek tests which systematically explore the fundamental traits of any given phase of mentality, say, of intelligence or motor capacity? Or shall we merely assemble empirically a series of loosely related tests which meet the pragmatic test—which seem satisfactorily to measure the different functional levels from infancy to maturity? That is, will the ideal scale be eclectic in character, including any tests that prove of value, whether or not such tests fit logically into a predetermined system? Shall we include only tests which are easily and rapidly administered? Or shall we include cumbersome tests which require 5 or 10 minutes to give? One of the recent scales contains lengthy,

cumbersome tests which do not seem to justify the time needed to give them. Shall we include tests which measure the extent to which the individual has profited from experience, or, in other words, which show capacity for improvement, an important element in mental diagnosis?

These are questions which, I believe, still await satisfactory solution. Personally I feel that we should seek primarily for tests which measure inherent strength or *capacity* as against mere *attainment*, but this distinction cannot be drawn too sharply because the strength of different traits after early infancy is the resultant of two factors; first, the development which is due to hereditary propulsion and, second, the development which is due to the experience of the individual. I believe, also, that we must use more relatively complex than simple tests. But, in any case, the tests must be of such a character or be so arranged as to measure mental development from stage to stage up to the point of mental maturity, if such a point can be definitely determined. I should hesitate very much to say, with Professor Yerkes, that this point comes approximately at 16. Some traits probably mature at 15, others at 16, and still others at 20 or later. This is another question which must be carefully determined and until it has been satisfactorily determined it is the part of discretion not to announce any hypothetical figure, because the moment such a figure is announced some examiners will utilize it as a demonstrated fact for purposes of practical diagnosis, just as arbitrary and hypothetical standards of feeble-mindedness have been inadvisably used in connection with the Binet scale. My present position, then, is entirely in harmony with Huey's view that "Mind grows on to a maturity not complete till in the twenties. Indeed it grows further, normally, in a transformation with the life cycle, to a different character and strength, harmonious with and normal to each period of chronological age. What are the norms and the tests then for the levels of 14, 16, 20, 24 years? And what are the most significant functions to which we shall apply these tests and norms?"

In the same way, once the tests have been selected, we must determine either by theoretically acceptable scientific criteria, or by considerations of practicability and workability, the best method of arranging them and computing the results, whether according to the age-gradation method, or the point scale method, or a combination of the two, or some other method. The Binet scale has fallen into considerable disrepute, but this is due less to the inherent defects of

the scale itself, which many workers for long have pointed out, than to the unfounded claims which have been put forth as to its amazing accuracy, its wonderful diagnostic possibilities, bordering on the infallible within limits which have been broadly specified, the rigid standards which have been arbitrarily proposed for the determination of feeble-mindedness, and the wide use which has been made of the scale and the proposed arbitrary standards for determining the number of pupils, criminals, prostitutes, etc., who are feeble-minded, by persons who are psychologically unqualified to make mental diagnoses. These extravagances, and perverted applications of the scale, not justified by anything authorized by Binet himself, have evoked sharp criticisms by those who cannot sanction this type of science, but these criticisms, unfortunately, have frequently been interpreted as criticisms of the scale itself rather than of its perverted uses. Within its limitations, in spite of all its shortcomings, I have found the scale of very considerable value, and shall probably continue to use it (give both the 1908 and 1911 tests and rate my cases by both scales) until a superior system has been evolved. I must, however, confess to a certain prejudice in favor of the Binet arrangement, as I have used it continuously for six years and have become accustomed to make subjective allowances and supplementations and to rating examinees in terms of this scale. I do not, of course, approve of the idea of making all the age-steps uniformly represent one year of development. In the earlier years smaller units, say, one-third or one-half year units, may be used, while in the upper years the unit may be made larger, covering, say two or three years.

One of the patent advantages of the Binet method is the formulation of the result in terms which can be easily comprehended by the average person, and which have considerable significance, namely in terms of mental age (or the equivalent normal chronological age). While this method also has its disadvantages, I am not certain that the disadvantages can be overcome by the point scale method of rating. It would be difficult to use the pooled sum from the accumulation of points for diagnostic purposes during the *period of mental growth* without translating them into terms of normal chronological age, or successive developmental units. Seventy-five in the point scale would mean something entirely different for a five-year old than for a ten-year old. For adults it might have approximately the same significance, due allowance being made for such factors as Yerkes has specified. Nor do I see that this difficulty would be sur-

mounted by the use of the three scales proposed by Yerkes to cover successive four year periods of development from 0 to 16, for, if I am correct, the pooled sum from each scale would still have different meanings for the children of the different ages or stages of development included in each scale. A scale of intelligence for school use must aid the examiner in distinguishing between the children who should be assigned to special schools for the feeble-minded and those who should be assigned to ungraded classes for the borderline, backward and merely retarded. In order to serve this purpose the scale must supply norms for each age or stage of development from the age of school entrance to at least the mid-adolescent years.

It would, of course, be possible to test children of different stages or ages of development and establish a pooled norm for each stage of development, and then state the results for any child examined in terms of the per cent. of the normal result for his age. In such a case we should have to determine independently (1) the exact significance of any given percentage of normal functioning, say 60%, and (2) whether 60% of normal capacity at, *e. g.*, age four would have the same significance for diagnostic purposes as 60% capacity at age 12, 16 or 20, which I am inclined to doubt from my experience with the intelligent quotient.

2. It is still a question whether norms of performance can be secured by testing an unselected array of children including the abnormal as well as the normal. We do not standardize the clinical thermometer, or establish norms for the pulse rate on the basis of pathological material. The most recent norms for the Seguin form-board based on a selected array of normal pupils (75% average and about 12.5% each dull and bright) are quite different from the earlier norms which were based on unselected arrays or only partly selected arrays. Shall we standardize medical tests on the basis of healthy material, but psychological tests on the basis of both normal and abnormal material? The theoretical solutions thus far proffered to this question are not, to my mind, conclusive. The question needs further consideration.

3. We need a series of fundamental tests and norms of what I may designate psycho-motor capacity. By tests of psycho-motor capacity I do not refer to tests merely of motor strength, coördination, steadiness or speed, although all such tests involve a modicum of attentive control and perceptual analysis; but I refer to motor problems, the skillful solution of which puts a premium upon the individual's keen-

ness of observation, power of intellectual analysis and perceptual discrimination, ability to adjust himself to a novel situation and to profit from the memory of former adjustments. Not the least advantage of such tests is that they are relatively independent of the individual's linguistic ability. There are no scales which will compare in importance, I believe, with those of intellectual and psychomotor capacity. I am at present attempting to secure norms for a very simple series of peg form-boards, but this work proceeds slowly as the practical work of classifying, diagnosing and prescribing for the clinic cases and the offering of instruction consumes my time.

4. The testing out and standardizing of tests, the arrangement of tests into scales, the establishment of thoroughly reliable norms and the working out of diagnostic indices represent a large program of work which will require the cooperation of many workers during a number of years. This work should be undertaken by a station of psychological tests and standards, supported on an adequate scale either by a private research foundation or by a government subvention. The station should command a budget of about $50,000 annually. If this work is worth doing at all it is worth doing well. In order to obtain reliable norms it would be desirable to test many thousands of cases from infancy to maturity. The needs of such a bureau have been presented before, but no effective action has yet come from the agitation. Since the securing of proper financial support for a research bureau is problematical, the logical agency to organize the work is the American Psychological Association (or the Society of College Teachers of Education). An "association scale" would command wide acceptance. But the construction of a satisfactory scale would require the coöperation of quite a number of workers during a period of five or ten years. No doubt, much valuable preliminary work could be done by a committee on diagnostic tests and standards.

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Mental testing is an aspect of applied psychology that has assumed rather too elaborate and dignified proportions to be longer regarded, even by its critics, as a passing fad. Like all new movements that promise to bring scientific conceptions and technique into the service of society, it has suffered somewhat at the hands of friends in whom

eagerness exceeded exactitude, and it has suffered likewise in the hands of charlatans who have never scrupled to trade upon science for their private gain. In the main, however, progress in mental testing has been, I think, as real and as striking as in any field of pure or applied psychology.

The period when experiments as developed in the laboratory of pure psychology were taken over with little modification as mental tests has been succeeded by the period in which tests have been devised with more immediate view to their purpose, and dilettante dabbling with isolated tests has been largely supplanted by more or less elaborate attempts at the construction of systems or combinations of tests so ordered and so pooled as at once to probe mentality from various angles and to summarize the result in a single index of mental status or mental ability.

I take it that the pressing practical need for a measure of general intelligence has been the incentive to the development just depicted. We have this practical need to thank for the Binet-Simon tests with all the astounding wealth of comment and criticism (witness Kohs' list of 254 titles prior to May, 1914), and the varied and stimulating efforts to improve and revise this famous series of tests. Many workers have felt, and strongly, that much of the too-amateurish application and exploitation of Binet's device is not only a deplorable waste of energy but also a direct check upon the development of this important aspect of mental testing. With this view I am mainly agreed, though I do not feel quite so strongly as do some of my colleagues that erroneous diagnoses are likely to be made when the testing is in the hands of persons who have the requisite psychological training, just because a given formulation of these tests is used rather than some other one. We must meet these difficulties, I think, primarily by rigorous training of those who make a business of testing for diagnostic purposes. The great need of the tester is that he shall come to "feel" the conditions under which testing is reliable almost intuitively. The possibility of establishing some sort of standardizing bureau by the appointment of a committee for determining, once and for all, just how the Binet tests, or any other tests, shall be administered seems to me to become daily more remote and difficult. I expect, rather, that the best methods will emerge on their own merits and from individual initiative when they shall have proved these merits by the pragmatic test of "delivering the goods."

It is evident that the Binet-Simon scale, or any superior substitute for it that may be developed, is, after all, of pretty limited service

when the broader possibilities of mental testing are considered. We need right away, for instance, some similar set of tests for providing a reliable scale for the general intellectual level of adolescents. Take here the single illustration of the need for satisfactory standards of mental capacity for college entrants. My own notion of the method to be followed in meeting this need and others like it is roughly as follows: (1) Prepare from *a priori* considerations a list of the part-functions that appear to constitute the main ingredients in "general intelligence." (2) Draw up a list of the mental tests available that appear most clearly to measure off these part-functions. (3) By trial refine these tests until their technique (instructions, arrangement of material, rules for scoring) is reasonably well perfected. (4) Apply the revised tests upon a good-sized group of subjects. (5) Draw up correlations between the results of these tests themselves, and between each of them and several other appraisals of general intelligence (school-grades, estimates of teachers, success in daily life, etc., all with the best precautions that we have to insure reliability). (6) Wherever two or more of the tests correlate with one another to a marked or high degree, discard the poorer one or ones (as being substantially measures of the same part function or functions). (7) Wherever a given test shows a very low correlation with intelligence discard it. (8) With the tests that remain try the pooling or amalgamation of their results according to various loadings to discover that weighting of each that shall yield the highest final correlation with the presumably best appraisal of general intelligence. (9) Lay off the percentile distributions for each of the selected tests and for their amalgamated indexes, with proper regard, if need be, for dependence on sex, age, and social and academic status. (1) Determine on these distributions the "dead line" above which performance must rise in order that success in university work or in various other directions may be predicted. This program is scarcely new; perhaps no portion of it is new, but I think no investigator has carried it through completely. I have been toying with parts of it for several years, and a more serious attack upon it is now under way at the University of Illinois, of the details of which it would hardly be appropriate to talk just here.

There is one other aspect of mental testing that seems at times to be quite lost sight of in the present anxiety for diagnosing general intelligence. I refer to the use of mental tests for the intensive and rather precise analysis of the specific abilities of an individual for the

construction of what Stern calls "psychograms" of individuals. This is clearly a different undertaking from the determination of level of general ability. Yet many of the problems that confront the applied psychologist do assume this specific aspect. Thus, in attempting to diagnose the sources of difficulty that prevented certain students from achieving adequate results in their academic work I sought in a few cases to undertake a fairly extensive exploration of their mental equipment; but this work has been greatly handicapped for lack of any well-justified program of testing and for lack of reliable norms with which to compare the performances of these students as they were determined. I should welcome the publication of numerous comprehensive analyses by mental tests of the mentality of individuals, especially of individuals that presented exceptions to the average—either by superiority or inferiority. It might well be that these interesting special cases would come to group themselves into certain roughly defined types so that prognosis would become relatively simplified. I seem, for example, to have encountered several cases of failure in secondary school and college work in which general intelligence was average or better, but in which a fundamental inability to deal readily with linguistic symbols rendered ordinary school progress well-nigh impossible.

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THE
JOURNAL OF EDUCATIONAL PSYCHOLOGY

INCLUDING EXPERIMENTAL PEDAGOGY, CHILD PHYSIOLOGY AND HYGIENE, AND EDUCATIONAL STATISTICS

Edited by

W. C. BAGLEY, C. E. SEASHORE,
J. CARLETON BELL, Managing Editor GUY MONTROSE WHIPPLE.

Published monthly except July and August by
WARWICK & YORK, INC.,
LANCASTER, PA. BALTIMORE, MD.

Manuscripts for publication, books or other material for review, and news items of interest to educational psychologists should be addressed to The Managing Editor, J. Carleton Bell, University of Texas, Austin, Texas. Research contributions from England may be sent to W. H. Winch, Esq., Melville Villa, Overhill Road, Dulwich, London.

The Journal is issuing a series of Monograph Supplements for the publication of more extensive researches in educational psychology. For details prospective contributors may apply to Guy Montrose Whipple, University of Illinois, Urbana, Ill.

The price of the Journal is $2.50 per year of ten monthly issues. Foreign postage is 20 cents extra for Canada and 30 cents for other countries in the Postal Union.

Subscriptions and correspondence concerning business matters should be sent to Warwick & York, Inc.

VOLUME VII JUNE, 1916 NUMBER 6

EDITORIAL

A PROBLEM IN EDUCATIONAL VALUES

A person with whom we are well acquainted and with whom we frequently discuss educational problems, has rather pronounced views upon educational values. Most people have, for that matter. These particular views, however, are unique in that the person referred to formulated them pretty early in life and consistently applied them to the later stages of his own education. He was left fairly free to choose most of his studies, and he deliberately made this choice upon the basis, not of interest, but of distaste. His reasoning was simple: he wished to take advantage of the stimulus of classwork and of the systematic routine of required effort in order (as he states it) to "train" the capacities in which he was obviously weak. His was a naïve educational philosophy in which the doctrine of formal discipline (strongly impregnated with Calvinism) played an important part; but he is morally certain that his philosophy "works."

And very likely it did work and will work within reasonable limits. To give the will some "gratuitous exercise" every day will doubtless have the salutary influence that James ascribed to the practice. The chief difficulty in adopting it as an educational policy lies in making

certain that the exercise is "gratuitous." But the important question just now is whether this type of training represents anything more than the possible development, ideal of mastery over immediate desire and interest. Does it really represent beyond this a training of more specific capacities, and is it wise to train these capacities if they do not have the advantage of innate strength? If I find mathematics so distasteful that I avoid mathematical work whenever possible, will even a gratuitous effort to master mathematics result in an improvement in ability that is proportionate to the time and energy expended, or an improvement that will compensate for the loss of opportunity to spend this time and energy in developing a capacity that shows greater promise?

ITS BEARING UPON CURRICULUM READJUSTMENTS

This problem, we believe, lies at the center of current discussions regarding curriculum-reorganization. It is in part a psychological problem and in part a problem of general educational theory. Psychology must answer the questions, "In how far does distaste mean lack of native ability? In how far can weak native ability be developed by specific training?" General educational theory must answer the question, "Is it worth while to make the attempt?"

There is at present a strong disposition upon the part of school administrators and of an influential group of educational theorists to answer the latter question in the negative. School administrators are feeling more and more keenly the pressure to adjust curriculum materials to varying capacities; the increasing numbers of pupils retained for the high school is continually intensifying this pressure. The type of adjustment that makes the strongest appeal is that which would provide different subjects for individuals and groups of varying capacities. Some of the larger difficulties and dangers involved in an extreme or a premature application of this theory have been pointed out by the present writer, primarily upon the ground that the needs of democracy demand a certain community of culture, and that a reasonable measure of uniformity in curriculum-materials will work toward this end. Others, however, have a somewhat different conception of democracy, and believe that the largest possible latitude for individual development—the most intensive training of the most pronounced native abilities—will serve to realize the democratic ideal much more effectively than will any attempt to secure uniformity in culture.

There is certainly abundant room for argument in connection with this problem, but this is the phase of the question that must be solved by general educational theory rather than by educational psychology. What educational psychology can do, however, is to lay bare the facts. It can answer the two questions just stated, and there is especial need just now for answering the second of these—"In how far can weak native ability be profitably trained?" There are some high-school pupils for example, who seem to profit in no way by the study of algebra and geometry. Assuming that these subjects furnish the best available means for giving one a conception of what abstract and symbolic thinking means, and some valuable exercise in this type of thinking (an assumption which can be theoretically defended), is this value to be realized in any appreciable measure among those pupils who find these subjects extremely distasteful? It is at least conceivable that the trouble which many pupils experience in connection with these subjects is greatly intensified by the fact that they are continually measuring their weakness against the strength of others. Under such conditions, of course, discouragement and its consequent depression form what might be called an extraneous or factitious handicap. The administrative expedient that at once suggests itself in this case is differentiation of classes on the basis of standards of accomplishment and rate of progress. But the fundamental question is whether any progress that is possible under these conditions is really worth while.

HOW FAR IS IT PRACTICABLE TO TRAIN WEAK ABILITIES?

The same question arises not only in connection with every subject for which a disciplinary outcome is primarily assumed, but also in connection with such subjects as history, literature, and the biological sciences all of which are commonly justified upon the basis of informational and appreciative outcomes. (We note with apprehension, for example, that history does not appear in some of the curriculums proposed for junior high schools. Does this mean that pupils are to be trained for "citizenship" with only the simple, biographical history that is taught in the lower grades, and largely because some boys and girls do not "take" to this subject?) But the problem is especially acute in connection with studies that are intrinsically difficult because they demand a relatively high type of conceptualizing ability.

The older view of mental discipline assumed a direct relationship between the difficulty of a subject and its disciplinary value—an assumption that is eminently well adapted to encourage careless teaching—and, on the other hand, an assumption that handicapped the doctrine with an adventitious disadvantage when the day of skepticism dawned. (The lines of greatest resistance are very naturally unpopular.) With the reconstruction of the doctrine, too, the possibility of this direct relationship has been pretty carefully avoided. If, however, "general" training depends primarily upon the possibility of lifting a procedure to the conceptual level, and endowing it with a consciousness of worth, it is possible that the older assumption possesses a measure of truth.

MENTAL DISCIPLINE IN "SHEEP-JUDGING"

This possibility was suggested in an interesting way by a fact that came to the writer's attention a few days ago. In the College of Agriculture at the University of Illinois, several courses in "stock-judging" are either required or elective in many of the curriculums. In any case, large numbers of students "take" practically all of these courses. There seems to be no requirement regarding the sequence, but the students themselves have "hit upon" a definite order which has, we understand, become a tradition. The course dealing with "sheep-judging" is almost always elected as the first course. When we inquired into the situation, we found that the tradition carried with it a reason that was quite conscious to the students. Sheep-judging is much more difficult than the other courses. Nor did the reasoning stop at this point. The students definitely affirmed that because of this difficulty they were compelled in this course to develop a "method of procedure,"—in other words to "conceptualize" the process; a necessity that did not arise in like degree in the other courses. Once in command of the method, the other courses were "easy."

The situation reminds us of the tradition regarding the strenuous mathematical training that has been associated with the Cambridge degree, and of the answer which a Cambridge man is said to have given when asked what advantage he gained from the severe mathematical discipline when he never used his mathematics afterward. "It was valuable," he said, "because, after that strenuous experience, everything else was easy."

In any case, the relation of difficulty to mental mastery is a significant question—a question that studies of initial distaste and sub-

sequent progress might go a long way toward answering. It is pretty clearly apparent at the present writing that the ideals reflected in the organization and administration of the people's schools have a profound influence upon the progress and destiny of the nation. Present-day ideals and tendencies in American education certainly do not smack of virility and strength, whatever else may be said of them. They may be worthy ideals—but they bear scrutiny.

W. C. B.

NOTES AND NEWS

At Albany, New York, a number of philanthropic citizens interested in social welfare have organized the Albany Social Science Society with Dr. Clinton P. McCord as president. The purpose of the society is to disseminate the principles of a sound and practical knowledge of social welfare work in the city and county of Albany, through such channels as conferences, lectures, exhibits, and scientific and popular writings; to serve as a place of clearance for scientific information regarding the various phases of charitable and social activities; to establish scientific standards in the field of local social welfare work; and to review critically all measures or plans suggested as desirable in the local field of social welfare work. There are to be special sections or groups for the subjects of crime and delinquency; settlements and clubs; private charities; health; institutions; city and county charity; socialized education; and local state officers' social problems. Active membership in the society may be secured by all those interested on payment of the membership fee of two dollars.

The Department of Educational Investigation and Measurement of the City of Boston under the direction of Dr. Frank W. Ballou has recently issued a bulletin of twenty-five pages devoted to the determination of a standard in accurate copying of English. The test was given to 4,494 first-year pupils in Boston high schools, and the results were scored with reference to spelling, capitalization, omitted words, added words, wrong words used, misplaced words, punctuation, undotted "i's," and uncrossed "t's." The average number of errors per pupil was 5.54. The largest group of errors was undotted "i's," 8,794. Spelling and punctuation came next with 5,800 errros each. The boys make a larger proportion of errors than the girls.

The subject of formal discipline is evidently receiving a great deal of attention from psychological and educational writers. In addition to W. G. Sleight's book "Educational Values and Methods Based on the Principles uf the Training Process," which appeared last summer, and J. E. Coover's elaborate monograph on formal discipline, noticed in another section of this issue, the firm of War-

wick and York announces the forthcoming publication of no less than three books on this subject. They are Nellie P. Hewins' "The Doctrine of Formal Discipline in the Light of Experimental Investigation," Chang Ping Wang's "The General Value of Visual Sense Training in Children," and Harold O. Rugg's "The Experimental Determination of Mental Discipline in School Studies."

The Texas State Department of Public Health, the Extension Department of the University of Texas, and the International Health Commission have undertaken a sanitary and health campaign in Leon County, Texas. Three districts in this county, situated in and near Navasoto River and tributary creek bottoms, where the malaria and hookwork infection is very heavy, have been chosen for intensive work. The campaign involves making the necessary examinations of each individual in the three districts for hook worm and malaria and treating until cured those found infected. In order to partially determine what improvement results from treatment all the school children in the three districts have been tested and examined with the following tests: (1) Thorndike Reading test, (2) Courtis Arithmetic, (3) Starch Arithmetic, (4) Trabue Completion, (5) speed of tapping, (6) vital capacity, (7) weight, (8) strength of grip. The first four tests mentioned have each been divided into two parts of equal difficulty. The children have been tested with the first parts of each of these tests and will be tested, at the conclusion of the campiagn, four months later with the second parts. In this manner the improvement of those (1) not affected, (2) affected and not treated, and (3) affected and treated, can be compared. Doctor P. W. Covington of the International Health Commission and Dr. E. W. Breihan of the University of Texas Extension Department are conducting the health campaign, and Dr. Truman L. Kelley and Mr. D. L. Hoopingarner of the Division of Child Welfare of the Extension Department of the University of Texas are conducting the mental and physical tests of the school children.

Professor E. A. Kirkpatrick, of the Fitchburg (Mass.) State Normal School, will give a course of lectures the coming summer at the State Normal College at Greeley, Colo., the State College at Pullman, Wash., and the State University at Eugene, Oregon.—*School and Society*.

On March 21 Dr. Shepherd Ivory Franz of Washington, D. C., addressed the students of Swarthmore College on "The Psychology of Delusions" and on the 27th Professor Warner Brown of the University of California spoke on the "Psychology of Advertising." Dr. Bird T. Baldwin of Swarthmore will give the undergraduate and graduate courses in Educational Psychology at Johns Hopkins University during the Summer Sessions.

Dr. David Spence Hill, Director of the Bureau of Educational Research, New Orleans Public Schools, will be a member of the faculty of the University of California Summer Session.

George Ordahl (Ph.D., Clark University), formerly Professor of Psychology and Education, University of Nevada, and for one year State Psychologist, Lincoln, Illinois, now connected with the Buckel Foundation for the study of Backward and Defective Children, Standord University, has been appointed psychologist and educational director at the Sonoma State Home, Eldridge, California.

Dr. J. Carleton Bell, for the past four years professor of the art of teaching at the University of Texas, will return to the Brooklyn Training School for Teachers in September.

PUBLICATIONS RECEIVED

(Notice in this section does not preclude a more extended review.)

Academic Status of Psychology in the Normal Schools. Report of the Committee of the American Psychological Association on the Academic Status of Psychology. Princeton: December, 1915. Pp. 33.

Part I of this report was prepared by Professor Margaret F. Washburn, of Vassar, and deals with the training of instructors. It is significant that many heads of normal schools look with suspicion upon the trained psychologist, and frankly avow that they prefer a good teacher who has had little training in psychology. Part II discusses the present status of the teaching of psychology, presenting charts to show the required work in psychology, subject matter, size of classes, laboratory equipment, and aims of work. This section was prepared by Professor Bird T. Baldwin, of Swarthmore. An appendix gives sample outlines of courses of study.

J. Mace Andress. *Johann Gottfried Herder as an Educator.* New York: G. E. Stechert & Co., 1916. Pp. 316. $1.25.

A well-written account of Herder's life, and a careful appreciation of his contributions to the educational thought of his time. Three-quarters of a century before Darwin he expounded the essential principles of evolutionary thinking in such a manner that they became a part of the German viewpoint in education.

Nora Atwood. *Theory and Practice of the Kindergarten.* Boston: Houghton Mifflin Company, 1916. Pp. ix, 185. 60c.

This little book is designed to aid the young kindergartner in adjusting herself to the actual work of dealing with children, and to bridge the gap between theory and practice. There is a detailed discussion of the kindergarten program, the kindergarten gifts, the use of the story, and the relation between the kindergartner and the primary teacher.

Clarence R. Aurner. *History of Education in Iowa. Volume IV.* Iowa City: State Historical Society of Iowa, 1916. Pp. xi, 470.

The fourth volume of this comprehensive work deals with the history of Iowa's three state institutions of higher learning, the State University, the State College of Abriculture and Mechanic Arts, and the State Teachers' College. The book is a model of clear and forceful historical exposition, and is a most admirable contribution to the history of higher education in America. If other states would follow

the example of Iowa, we should soon have the materials made available for a complete and definite understanding of educational movements in this country.

JAMES H. BAKER. *American University Progress.* New York: Longmans, Green and Company, 1916. Pp. 189. $1.00.

"This book is not merely a study of the American university, but also of problems of college and school and of sociology. Throughout is found reference to the reorganization of American education, economy of time in education, and the relation of education to service and to social administrative efficiency, and special chapters are devoted to these themes. The whole volume deals with present conditions and constructive ideals."

JESSIE H. BANCROFT AND W. D. PULVERMACHER. *Handbook of Athletic Games for Players, Instructors, and Spectators.* New York: The Macmillan Company, 1916. Pp. xxv, 627. $1.25.

This volume contains all that anyone needs to know about the leading athletic games, such as baseball, basketball, football, hockey, golf, handball, tennis, lacrosse, polo, track and field games, running and walking races, jumping and pole vaulting, weight, throwing, and rowing. The discussion of each game includes a description, rules, suggestions for play, a history of the game, a good working bibliography, and a glossary of the terms used in it. It is a very complete and serviceable handbook, and will doubtless be widely used in school and college circles.

WILFRED M. BARTON, M.D. *Manual of Vital Function Testing Methods and their Interpretation.* Boston: Richard G. Badger, 1916. Pp. 255. $1.50.

This is a strictly scientific book, and brings together the results of widely diverse observations and experiments in a manner which unfortunately is only too rare in medical treatises. "The great strides which have been made in recent years in all departments of vital functions exploration, the discovery of new methods and tests, together with the mass of casuistic and critical literature that has appeared, have rendered it highly important that all this correlated material should be collected together in book form." The functions considered include those of the liver, kidneys, pancreas, heart, and ductless glands.

RANDOLPH S. BOURNE. *The Gary Schools.* Boston: Houghton Mifflin Company, 1916. Pp. xix, 204.

This is an enthusiastic account of the Gary schools by an ardent advocate of the plan which Superintendent Wirt has evolved. From such a source we should not expect adverse criticisms, and those that receive any notice whatever are promptly disposed of. It is a sig-

nificant fact that the Gary schools are more imposing to the layman than to the educational specialist, and while we may readily acknowledge the administrative genius exhibited in the scheme, we should not let this blind us to patent weaknesses on the instructional side. The book is well written, and will win many friends for the Gary scheme.

ERNEST R. BRESLICH. *First-Year Mathematics. Fourth Edition.* Chicago: University of Chicago Press, 1916. Pp. xxiv, 345. $1.00.

With the marvellous growth of secondary education in the United States in the past two decades there has arisen an increasingly critical attitude toward the course of study. Both parents and teachers are subjecting the high school requirements to a rigorous inspection to determine whether the time spent on them is most profitably employed. Particularly do the traditional courses in algebra and geometry arouse misgivings. The subject matter of those courses is arranged in a formal rather than a natural manner, and as a result they are the most difficult subjects of the curriculum and give rise to the highest percentage of failures. In the present text the author has endeavored to combine into a single year's work the introductory aspects of algebra, geometry and the theory of numbers, and so to graduate the difficulty of the advance that the pupil will appreciate the significance of mathematical studies in life and will be stimulated to interest in and enthusiasm for them. To this end much stress is laid on biographical and historical materials, and there is frequent use of graphs from the first chapter on. The text will be especially welcome to the increasing number of superintendents who believe that only one year of mathematics should be required, and that thereafter all mathematical courses should be elective.

ALBERT PERRY BRIGHAM AND CHARLES T. MCFARLANE. *Essentials of Geography.* Cincinnati: American Book Company, 1916. First Book, Pp. vi, 266. Second Book, Pp. vi, 426.

These two geography books constitute a triumph of the bookmaker's art. The illustrations are magnificent, the maps are clear and well executed, showing both physical and political features of each group of states, and the text is excellently adapted to the needs of the pupils. In the hands of a skillful teacher these books should induce children to love geography above all other subjects.

FRANK FORREST BUNKER. *Reorganization of the Public School System.* Bulletin 1916. No. 8. Washington: Bureau of Education, 1916. Pp. VI, 186.

This very interesting monograph presents a historical survey of education in the United States from colonial days to the present,

with emphasis on the changes in school organization which have taken place in the last two decades.

JOHN EDGAR COOVER. *Formal Discipline from the Standpoint of Experimental Psychology.* Psychological Monographs. Vol. 20, No. 3. January, 1916. Whole No. 87. Pp. VIII, 307.

Part One of this scholarly monograph gives an orientation in the subject, recounting briefly the most important results of previous experiments. Part Two, comprising over two hundred pages, reports the results of experiments with such material as marking out words, estimating weights, visual and auditory discrimination, and two extended series of tests on attention and on reproduction. The author concludes that even the simplest exercises involving attention and reproduction are extremely complex processes from the point of view of the mental activities involved. The "common factor" underlying two types of behavior or two different experiences may be cognitive in its character or may consist in emotional and volitional attitudes. In the latter case it is frequently more effective in making general the results of special practice than in the former. Purely specific reactions are non-existent. There is always a certain "spread," and the question is how significant is this "spread" for responses to other situations. The general effects of practice in these relatively simple mental activities are so great that there is good reason to believe that work in the more complex school subjects through a series of years has a very much greater general effect. There is a very complete bibliography of thirteen pages, and an appendix of forty pages presenting tables and graphs of results. It is undoubtedly the most elaborate investigation of the subject of formal discipline that has yet been attempted.

J. FORSYTH CRAWFORD. *The Relation of Inference to Fact in Mill's Logic.* University of Chicago Philosophic Studies, No. 5. Chicago: University of Chicago Press, 1916. Pp. 50. 50c.

A thoroughgoing discussion of Mill's view of inference.

GEORGE W. CRILE. *Man—An Adaptive Mechanicism.* New York: The Macmillan Company, 1916. Pp. XVI, 387. $2.50.

In this interesting book the author has gathered together from a wide range of sources, chiefly biological and medical, the data that seemed to him to prove that man is a mechanism that has developed in adaptation to the influences of the environment. Chapter One presents many illustrations of adaptation and applies these to the elucidation of the term. Subsequent chapters discuss the nervous system as an instrument of adaptation; the receptive organs, with emphasis on chemical changes and their relation to the emotions; the kinetic system, consisting of the brain, the thyroid, the adrenals,

the liver and the muscles; and a series of chapters on the biologica interpretation of health and disease. In the latter group of chapters the author discusses from a purely mechanistic point of view such phenomena as the action of drugs, sleep, pain, laughter, weeping, and the electro-chemical manifestations of the living organism. The book contains a large number of illustrations.

C. O. DAVIS. *High School Standings of Pupils from Graded and Ungraded Elementary Schools.* Reprinted from Educational Administration and Supervision, March, 1916. Pp. 159–174.

Pupils from ungraded schools tend to fall behind those from graded schools in the early semesters of the high school course, but if they persist in school, they equal and finally surpass their fellows.

G. V. N. DEARBORN. *Economy in Study.* Scientific American Supplement, April 15 and April 29, 1916.

The first of these papers contains pertinent hints on how to observe and how to take notes; while the second deals with educative imagination. Of the latter the author distinguishes three types: reproductive or memory, constructive or foresight, and organic or the influence of the mind on the body.

G. V. N. DEARBORN. *The Influence of Joy.* Boston: Little, Brown and Company, 1916. XVIII, 233. $1.00.

In the past year or two the emotions of anger, grief, suffering, etc., have received a great deal of attention from physiologists. The learned investigations have undoubtedly thrown much light on the mechanism of the emotions, but have given little edification to those who are interested in the practical matter of living. Now comes Professor Dearborn with a monograph on the emotion of joy. This is treated first from a strictly physiological standpoint; then in the second part of the book, from the point of view of the significance of joy in the relations of life. Perhaps the most important chapters are those which discuss the influence of joy on nutrition, on the circulation and on the nervous system.

SANTE DE SANCTIS. *Educazione dei Deficienti.* Milano: Francesco Villardi, 1915. Pp. xviii, 300.

This little book presents the conclusions drawn from the author's sixteen years' experience in dealing with neuropathic and feeble-minded children in the institutions at Rome. There are chapters on the physical and mental development of the feeble-minded, the causes of mental deficiency, the measurement of intelligence, with especial reference to the Binet-Simon scale, the detection of abnormal pupils in school, and a discussion of the various types of schools and pedagogical procedures for the mentally deficient. The book contains much valuable material on the measurement of intelligence.

JOHN DEWEY. *Democracy and Education. An Introduction to the Philosophy of Education.* New York: The Macmillan Company, 1916. Pp. xii, 434. $1.40.

This is a meaty book and presents not only the latest, but also the most mature and most closely reasoned ideas of the author on the subject of education. The first part of the book is composed of chapters dealing with education from the social, the biological, and the disciplinary points of view. There is a detailed consideration of the doctrine of interest, of which the author is reputed a leading exponent, and an analysis of thinking in its relation to experience and to the method of education. The second part of the book deals with the significance of the various subjects of the curriculum, the values of different types of education, and finally theories of knowledge and of morals. It is a book which calls for careful, reflective study.

EDWARD DICKINSON. *Music and the Higher Education.* New York: Charles Scribner's Sons. 1915. Pp. 234. $1.50.

The present book is an example of much finer writing than the ordinary volume on an educational topic. Yet in proportion to the balanced phrasing and the elevation of style, one senses a lack of definiteness and constructive guidance. The author writes not because he is anxious to convince anyone, but because ideas well up in his mind and seek to be clothed in artistic, sonorous expression. The three important parts of the book are "The College and the Fine Arts," "Music in the College" and "Teacher and Critic." The latter is a philosophical sketch of the development of music.

JESSIE FIELD AND SCOTT NEARING. *Community Civics.* New York: The Macmillan Company, 1916. Pp. x, 270. 60c.

This book is designed for pupils in rural schools. It directs their attention to the broader aspects of farm life, and fosters the idea of the school as the center of the community.

ROBERT HERNDON FIFE, JR. *The German Empire Between Two Wars. A Study of the Political and Social Development of the Nation Between 1871 and 1914.* New York: The Macmillan Company. 1916. Pp. xiv, 400. $1.50.

This is a careful, sympathetic, but nonpartisan study of the evolution of the attitude which the German people have in the present war. It is a most interesting and readable book, and presents one of the best pictures of German political, social, and economic life that is to be had.

RALPH D. FLEMMING. *Railroad and Street Transportation.* Cleveland, Ohio: The Cleveland Education Survey, 1916. Pp. 76. 25c.

This volume is an excellent indication of the fact that the schools are no longer to do their work in a vacuum, but it is their function to

assist in preparing their pupils for life service. One of the great industries of Cleveland is railroading, and it is therefore right and proper that this education survey should make a careful study of the railroad and transportation systems that affect the life of the city. Every Cleveland teacher should be expected to be familiar with this little book, and teachers in other cities will find it profitable reading.

ABRAHAM FLEXNER. *A Modern School.* Publications of the General Education Board, Occasional Papers No. 3, 1916. Pp. 23.

The author trenchantly reveals many of the traditional absurdities of present day education, and advocates a curriculum constructed from the four domains of science, industry, aesthetics, and civics. In a few vigorous paragraphs he indicates the gain to be derived from each of these lines of study and shows wherein the traditional emphasis upon mathematics and classics fails to meet the needs of the present day.

FRANK NUGENT FREEMAN. *The Psychology of the Common Branches.* Boston: Houghton Mifflin Company, 1916. Pp. xii, 275. $1.25.

This is an interesting series of chapters presenting the author's reflections and observations on the teaching of the common branches. The chapters deal with handwriting, drawing, reading, music, spelling, history, geography, mathematics, and natural science. The author does not attempt to give any systematic survey of experimental studies in these fields, but contents himself with a more or less dogmatic statement of his own views, and with occasional illustrative references to experiments. The title is misleading. Far from being a psychological analysis of the activities involved in the study of these subjects, the book seems designed primarily as a teacher's guide. This is indicated by the hortatory tone of almost every sestion. The author's extended experimental work in psychology and education, and his familiarity with the whole field, result in making him a safe and reliable adviser, but this fact does not make the book a psychology by any means. Each chapter ends with a list of references for further reading. These references are largely to psychological and statistical studies, but the reader will gain little insight into the psychology of school subjects from the author's discussion.

ARTHUR I. GATES. *Diurnal Variations in Memory and Association.* University of California Publications in Psychology. Vol. 1, No. 5, March 3, 1916. Pp. 323–344.

The tests used included auditory memory for digits, visual memory for digits, Whipple's substitution test, a recognition test, and tests in logical memory. "From the early morning the efficiency of the organism begins to increase, culminating in a maximum in the late forenoon followed by a decline immediately after the noon meal,

with a subsequent rise toward the middle of the afternoon, and a final drop in the late afternoon."

ARTHUR I. GATES. *Variations in Efficiency During the Day, together with Practice Effects, Sex Differences, and Correlations.* University of California Publications in Psychology. Vol. 2, No. 1, March 16, 1916. Pp. 1–156.

This monograph presents the results of a series of tests on over one hundred and eighty pupils of the fifth and sixth grades at one hour intervals during the school day. The tests used were addition, multiplication, auditory memory, visual memory, recognition, speed and accuracy of movement, completion, and cancellation tests. There are elaborate tables of correlations for the two sexes and for separate groups, and there is an extended study of variations in efficiency. The highest average correlation is that between multiplication and addition (.72). Other correlations range usually from 0 to .30.

S. MONROE GRAVES. *Report of the School Committee of the Town of Wellesley, Massachusetts, for the Year Ending December 31, 1915.* Pp. 31.

This report contains an age-grade table and an estimate of the cost per pupil in elementary and high schools for the years 1910 to 1915.

CHARLES ELMER HOLLEY. *The Relationship between Persistence in School and Home Conditions.* The Fifteenth Yearbook of the National Society for the Study of Education. Part Two. 1916. Chicago: The University of Chicago Press. Pp. 119. 75c.

"A close correlation is discovered between years of schooling and the economic, social, and educational advantages of the homes from which the pupils come, and these environmental conditions appear to be more important than degree of native ability in determining the amount of schooling. Retardation and truancy are most frequent among the children of poor and uneducated parents. Size of family, however, has no appreciable effect on persistence in school." The monograph contains ninety-one tables, eleven graphs, and eight pages of bibliography on retardation and elimination.

WILLIAM R. HOOD. *Digest of State Laws Relating to Public Education in Force January 1, 1915.* Bulletin 1915, No. 47. Washington: Bureau of Education, 1916. Pp. 987.

The laws are classified under twenty-one rubrics, and under each of these the states are treated alphabetically. An appendix includes state constitutional provisions relating to public education.

BRENELLE HUNT. *A Community Arithmetic.* Cincinnati: The American Book Company, 1916. vii, 277.

This book is frankly informational as well as disciplinary, and is so constructed as to present practical problems from a wide range of industrial and commercial situations. Much of the space is devoted to pictures, diagrams, and other means of presenting these situations.

GEORGE WILLIAM HUNTER. *Laboratory Problems in Civic Biology.* Cincinnati: American Book Company, 1916. Pp. 283.

This is another book in which the problems for the development of the theory are chosen from familiar situations with the evident purpose of furnishing varied information, and, at the same time, developing technique. A feature of the book is the large number of reference books cited at the end of each chapter.

WALTER A. JESSUP. *The Teaching Staff.* Cleveland, Ohio: Cleveland Education Survey, 1916. Pp. 114. 25c.

The salaries paid Cleveland teachers are distinctly lower than in the greater number of American cities of like size. They are also relatively lower than the salaries paid other skilled workers in Cleveland. The author shows how greatly this works to the disadvantage of Cleveland schools in securing and holding their teachers.

EDWIN A. KIRKPATRICK. *Fundamentals of Sociology, with Special Emphasis on Community and Educational Problems.* Boston: Houghton, Mifflin Company, 1916. Pp. x, 291. $1.25.

There is a distinct need for a simple discussion of the fundamental phenomena of society for high school pupils. Most treatises on sociology are designed for rather advanced college students and are written from the point of view of the social theorist. But it is precisely those high school boys and girls whose formal academic training goes no further than stand in need of a connected survey of social institutions. While the present book was not designed for just this class of students, but rather for normal school and college students, the emphasis upon the biological point of view, the simplicity of treatment, and the limitation of the discussion to aspects of every day life commend the book for use with high school classes.

HENRY C. KREBS. *Reaching the Children. A Book for Teachers and Parents.* New York: A. S. Barnes & Co., 1916. Pp. vi, 127.

A series of talks on the various ways in which the teacher may stimulate and inspire pupils. The book is replete with anecdotes.

R. R. LUTZ. *The Metal Trades.* Cleveland, Ohio: The Cleveland Education Survey, 1916. Pp. 129. 25c.

A study of the metal trades of Cleveland from the point of view of what the schools can and ought to do in the way of preparing their

pupils for the best possible work in this field. The author concludes that there is no need for prevocational school training in the metal trades for the reason that very few boys from the public schools will enter these industries.

ROBERT ALEXANDER FIFE MCDONALD. *Adjustment of School Organization to Various Population Groups.* Teachers College Contributions to Education. No. 75. New York: Teachers College, Columbia University, 1915. Pp. v, 145.

The groups considered in this monograph are the deaf, the blind, the delinquent, the dependent and neglected, cripples, the feeble minded, non-English speaking immigrants, the tubercular and anemic, speech defectives, and the exceptionally gifted. The description of various methods of dealing with the latter class is particularly interesting, and should lead to a more careful consideration of the possibilities of special training for the exceptionally gifted.

M. MACLEVY. *The Tobacco Habit Easily Conquered.* New York:

There is more good common sense and sound psychology in this little book than are usually found in the exposition of a "system."

STEWART MACPHERSON. *The Musical Education of the Child.* Boston: The Boston Music Company, 1916. Pp. v, 77. 80c.

What is the function of music in the school and in social life? What can the teacher do to awaken an intelligent appreciation of music and a certain degree of skill in performance? What should be the aims and ideals of the music teacher of today? These are some of the questions discussed in this little book. Unfortunately the author's psychology does not get beyond James's *Talks to Teachers.*

JAMES MAHONEY. *The Advancement of the Teacher with the Class.* Bulletin, 1915, No. 42. Washington: Bureau of Education, 1916. Pp. 81. 10c.

By means of a questionnaire, the author has collected the opinions of superintendents and teachers in regard to the desirability and feasibility of having the teacher progress with the class. The author gives a survey of conditions in foreign schools, and then presents a summary of arguments for and against the plan. The general conclusions are favorable to the plan under proper safeguards.

J. EDWARD MAYMAN. *Teaching Elementary Science in Elementary Schools.* New York: Department of Education, Division of Reference and Research, Publication No. 13, 1915. Pp. 164.

This monograph is an abridgment of the doctor's thesis presented by the author at New York University, the full title of which is "An Experimental Investigation of the Book Method, Lecture Method,

and Experiment Method of Teaching Elementary Science in Elementary Schools." A brief digest of the conclusions are to be found in this JOURNAL, Volume 6, No. 4, April, 1915, Pp. 246–250.

ALBERT A. MERAS AND B. MERAS. *Le Second Livre.* Cincinnati: American Book Company, 1916. Pp. 213.

A series of graded lessons with readings and conversations based upon Jules Verne's "Tour of the World in Eighty Days."

DAYTON CLARENCE MILLER. *The Science of Musical Sounds.* New York: The Macmillan Company, 1916. Pp. viii, 286. $2.50.

This volume presents the author's Lowell Institute Lectures in 1914. The lectures were originally accompanied by demonstrations, and their place is taken in the book by a very large number of photographs and diagrams. The phases of musical analysis dealt with include the characteristics of tones, methods of recording and photographing sound waves, analysis and synthesis of harmonic curves, errors introduced by horn and diaphragm into sound records, the tone qualities of musical instruments, physical characteristics of the vowels, and the relations of the art and science of music. There is a bibliography of ninety numbers.

FLOYD S. MUCKEY. *The Natural Method of Voice Production in Speech and Sound.* New York: Charles Scribner's Sons, 1915. Pp. xiii, 149.

The earlier chapters of this little book deal with definitions, analysis and classification of facts, pitch, volume, quality, resonance, and interference with the vocal mechanisms. The natural method is one of non-interference, and a series of very simple exercises is indicated which, according to the author, should eliminate this interference almost entirely. There are several interesting photographs of the fluctuations of light induced by the tones of several famous singers.

National Education Association. Addresses and Proceedipgs. Oakland, California, 1915. Ann Arbor: Published by the Association, 1916. Pp. xii, 1193.

Of the scores of papers reported in this volume the following are of interest to educational psychologists: Madam Montessori's address before the general Association and the kindergarten section; the discussion of the investigation of the efficiency of schools and school systems, by Van Sickle, Ayres, Kendall, and Maxwell; current methods of dealing with the exceptional pupil, by Baylor, Cooper, Aldrich, Bryan, and Collicott; report of the committee on tests and standards of efficiency, by Blewett, Judd, Maxwell, Phillips, and Strayer; the mental hygiene of exceptional children, by Terman; and the papers presented at the meeting of the department of special education.

G. T. W. PATRICK. *The Psychology of Relaxation.* Boston: Houghton Mifflin Company, 1916. Pp. ix, 280. $1.25.

The author deals in what he calls strictly scientific fashion with the psychology of play, laughter, profanity, alcohol, and war. In all of these he finds a reaction from the excessive tension of modern life. With play and laughter the relaxation significance is obvious, while both profanity and the use of drugs can easily be shown to have their chief attraction in the feeling of relief from emotional strain. In like manner the author regards war as a kind of katharsis, a reversion to a primitive form of reaction which comes as a relief from too great tension.

RUDOLF PINTNER AND DONALD G. PATERSON. *Learning Tests with Deaf Children.* Psychological Monographs, Vol. 20: No. 4, Whole No. 88, February, 1916. Pp. 57.

One thousand deaf children in three state schools were tested by the digit-symbol and the symbol-digit substitution tests proposed by Whipple and used on normal children by Pyle. The authors conclude that the deaf child is about three years behind the hearing child in learning ability, and that the congenitally deaf and the adventitiously deaf are equally retarded.

EDWIN W. ROESSLER AND ALFRED REMY. *A First Spanish Reader, with Questions and Vocabulary.* Cincinnati: The American Book Company, 1916. Pp. 248.

This reader is arranged on a sort of radial or spiral plan, beginning with the immediate environment of the pupil and ranging outward to more remote and complicated situations.

FRANK L. SHAW. *The Building Trades.* Cleveland: Cleveland Education Survey, 1916. Pp. 107. 25c.

The author thinks that vocational training for the building trades should be started not later than the seventh grade. The junior high school affords an excellent opportunity for differentiation of work, and for such an arrangement of the curriculum as to offer the constructional geometry, elementary science and mechanical drawing needed in these trades so that boys will get them early in the course.

FRANK L. SHAW. *The Printing Trades.* Cleveland: Cleveland Education Survey, 1916. Pp. 95. 25c.

These trades are so highly differentiated that training in one branch is of little or no value in another. This high degree of specialization and the fact that only a very small per cent. of school boys go into any phase of the printing industry make it inadvisable to attempt special training in school. A general shop course is recommended.